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ASSESSMENT OF THE BLISS SYMBOL COMMUNICATION
SYSTEM IN ADULT APHASICS WITH SEVERE
ORAL AND VERBAL APRAXIA

BY

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Communication System in
adult aphasic with severe
oral and verbal apraxia

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and Learning
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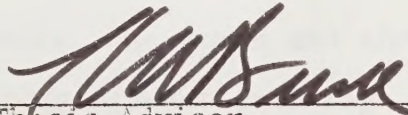


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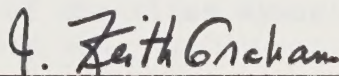
BY

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ABSTRACT

In only one prior investigation (Saya, 1979) has an attempt been made to evaluate the usefulness of Blissymbolics as an alternative/augmentative communication system for nonverbal and nonapraxic adult aphasics. The purpose of this study was to evaluate the rate and extent of acquisition of the Bliss symbol communication system by adult aphasics with severe oral and verbal apraxia. These were individuals who had had a period of traditional speech-language management involving a speech-response mode, and whose available speech consisted primarily of unintelligible spontaneous vocalizations and/or gross gestures. It was considered to be clinically significant to determine whether acquisition of the Bliss symbol system would occur, and whether this symbol acquisition would improve functional communication skills. A study of this type has not previously been conducted.

Four adult apraxic-aphasics, one woman and three men, participated in a 20-hour management training program conducted by the investigator which involved the introduction and implementation of the Bliss symbol

communication system according to the Teaching Guidelines developed by McNaughton (OCCC, 1974), and incorporating La Pointe's (1977) Base-10 programmed stimulation design for aphasia management. The aphasic's skill in acquiring this nonverbal response mode was assessed by determining the number of Bliss symbols acquired at the end of the 20 hours of management, rate of acquisition (daily, weekly, cumulative), and level of ability to integrate the symbols into syntactically and semantically correct linguistic responses. The number of verbal responses produced by each subject was tabulated on a daily basis. Descriptive treatment of these ongoing behavioral data was employed.

To assess changes in speech-language behaviors as a result of symbol acquisition, pre- and post-management comparisons were made on the Overall score on the Porch Index of Communicative Abilities (PICA) and the three subtests (Gestural, Verbal, Graphic). These tests of mean difference were performed using a single classification analysis of variance procedure for repeated measures. In addition, significance of changes in pre- and post-management scores on the Functional Communication Profile (FCP) were assessed using the Wilcoxon signed-ranks test, another procedure for evaluating speech-language behaviors. The required alpha level for all tests was .05.

In an attempt to interpret changes in non-speech-language behaviors as well as functional use of the system outside the management session, pre- and post-management interviews with an individual in the aphasic's immediate living environment were conducted by the investigator.

The following represent the results of the investigation:

1. All subjects were able to learn and use the Bliss symbol communication system. The total number of symbols acquired varied across subjects and it appeared that the better the subject's receptive language skills and general communicative ability, the greater the number of symbols acquired.
2. The rate of symbol acquisition varied from subject to subject on a daily basis. For the most part, all subjects demonstrated a gradual increase in the total number of symbols acquired, with a fairly constant rate of change over the 20 sessions, yielding an approximately linear positive rate of change.
3. The number of symbols used in generating syntactically and semantically correct responses varied among subjects. Level of symbol integration into accurate linguistic responses also appeared to be related to level of receptive language capability and overall communication skills.

4. The number of intelligible responses produced by subjects varied on a daily basis and appeared to be related to overall verbal skills, those subjects exhibiting the most apraxia, having fewer intelligible responses. For all subjects, however, pointing to the Bliss symbols appeared to facilitate speech intelligibility.
5. Results of pre- and post-management comparisons of the PICA Overall and Gestural, Verbal, Graphic subtest scores were statistically non-significant.
6. Pre- and post-management comparisons in the FCP scores resulted in a statistically significant difference in overall functional communication skills. This represented an improvement in overall functional communication skills across all four subjects.
7. Descriptive treatment of pre- and post-management interviews for all subjects reflected positive and constructive changes in non-speech-language behaviors as well as varying degrees of functional use of the Bliss symbols in the subject's present living environment.

Within the limitations of the design and conduct of this investigation, the results would tend to suggest that the Bliss symbol communication system may be of value for apraxic-aphasic adults whose previous traditional speech-language management have failed to

provide a functional method of communication. Evidence of this conclusion comes from results which indicate that the symbol system can be learned and applied in developing syntactically and semantically correct linguistic responses. Furthermore, the availability of the Bliss symbol system appears to improve verbal intelligibility and the individual was judged to be more effective in communication in their immediate living environment.

The above conclusion is to be interpreted taking into consideration a number of other variables that are considered to relate to successful symbol acquisition and usage. They include: realization of need for supplemental communication system, amount and consistency in completion of homework assignments, degree of cooperation among individuals in immediate living environment, level of motivation and desire to communicate, and amount of embarrassment in symbol usage. In addition, the investigator's ability to find the most effective method in making the symbol system functional for each subject and acceptance of symbol usage by both the "user" and the "listener" proved to be crucial elements in successful acquisition and use of this alternative/augmentative communication system as a viable supplement to an existing deficient method of communication.

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INTRODUCTION

An effective method of communication for the adult aphasic with severe oral and verbal apraxia is the goal of a speech-language rehabilitation program. Those aphasics who have had a period of traditional language management involving a speech-response mode and whose available speech consists primarily of unintelligible spontaneous vocalizations or gross gestures, have a non-functional method of communicating. Present speech-language rehabilitation programs designed to return the severely impaired aphasic patient to communicative efficiency require vocal responses as the basis for management. Many adult aphasics with formulation problems complicated by the motor speech difficulty of apraxia, demonstrate minimal or no progress in these traditional speech-language programs. It is possible that a primary reason for failure may be that responses required are too difficult for the severe motorically impaired aphasic. Verbal and graphic modality responses require complex motor movements which the nonvocal apraxic-aphasic is unable to accomplish. Management programs requiring these complex motor movements may well be

unsuccessful in demonstrating measurable gains in speech-language function. This argues for development of an augmentative (nonvocal) communication system in order to fulfill existing deficient communication needs.

The purpose of this investigation was to determine whether severely impaired adult aphasics with oral and verbal apraxia can acquire the Bliss symbol communication system, and whether acquisition of the Bliss symbol communication system provides an overall improvement in functional communication skills. There is an almost complete absence of research and clinical literature on nonvocal rehabilitative approaches as alternative communication systems for the severely impaired adult aphasic. In addition, there is a general lack of supportive evidence on the efficiency of language management for adult aphasics (Darley, 1972). Darley (1972) recommended:

. . . more data are needed applying to clearly specified samples of the aphasic population subject to clearly specified regimens of therapy by a clinician for clearly specified periods (p. 8).

A need exists for investigations of speech-language training programs for adult aphasics. Therefore, development of a management program which facilitates or improves the aphasic patient's functional communication skills, whether in a vocal or nonvocal mode, is a logical approach.

This study was designed to assess the effects of acquisition of the Bliss symbol communication system on adult aphasics with severe oral and verbal apraxia. The number of Bliss symbols acquired, rate of Bliss symbol acquisition, and level of integration of Bliss symbols in linguistic structures, were evaluated. Changes in the following behaviors also were assessed pre- and post-management: receptive and expressive language skills as measured by gestural, verbal, and graphic modality response scores; overall functional communication skills; and non-speech-language behaviors as a result of investigation interviews with an individual in the aphasic's immediate living environment.

REVIEW OF THE LITERATURE

Review of literature includes selected information relative to (a) general classification and definition of terms; (b) nonvocal communication techniques with severely impaired speech and/or language individuals (hearing impaired, mentally retarded, autistic, and cerebral palsied); and, (c) nonvocal communication techniques with aphasic and/or apraxic individuals. Comprehensive reviews of information on the efficacy of present language rehabilitation programs for adult aphasics are presented in articles by Darley (1972) and Vignolo (1964).

General Classification and Definition of Terms

Description of and differentiation between aphasia, apraxia, and dysarthria is well documented in the literature (Darley, Aronson, and Brown, 1975; DeRenzi, Pieczero, and Vignolo, 1966; Johns and Darley, 1970; Deal and Darley, 1972; Perkins, 1971; Eisenson, 1973; Luria, 1964; Aten, Johns, and Darley, 1972; Penfield and Roberts, 1959; Kertesz, 1976; Brown, 1976; Schuell, Jenkins, and Jiminez-Pabon, 1964; Canter, 1973; Brain, 1965; Agranowitz and McKeown, 1964; and Wepman, 1951). A semantic confusion, however, has existed in use of the term "aphasia" (Skelly, 1974). Additional terminology include Broca's, motor, expressive, subcortical motor, aphemia, Marie's anarthria, verbal, cortical dysarthria, and apraxic dysarthria (Skelly, 1974). Regardless of the label chosen, most authorities regard aphasia, apraxia, and dysarthria as discrete syndromes. The general definition in Darley, Aronson, and Brown's (1975) classic treatment of motor speech disorders is consistent throughout the literature:

Aphasia is a multi-modality reduction in the capacity to decode (interpret) and encode (formulate) meaningful linguistic elements, that is, words (morphemes) and larger syntactic units . . . consequently manifested in reduced availability of vocabulary, reduced efficiency in the application of syntactic rules, reduced auditory retention span, and impaired efficiency in input and output channel selection (the arrangement of competing inputs or alternative outputs in some

heirarchical order and the selection of the appropriate signal to attend to or verbal response to emit (p. 1).
 Dysarthria composes a group of related speech disorders resulting from disturbances in muscular control of the speech mechanism because of damage to central or peripheral nervous system . . . whose speech mechanism displays some degree of weakness, slowness, incoordination, or altered muscle tone (p. 2).

Deal and Darley (1972) provided a comprehensive definition of apraxia:

Apraxia of speech, a term first applied by Liepman (1900), is defined as an articulatory disorder resulting from impairment, as the result of brain damage, of the capacity to program the positioning of speech musculature and the sequencing of muscle movements for the volitional production of phonemes. The speech musculature does not show significant weakness, slowness, or incoordination when used for reflex and automatic acts; however, prosodic alterations associated with the articulation problems are manifested perhaps in compensation for it (p. 639).

Darley, Aronson, and Brown (1975) add that apraxia is:

. . . characterized by highly variable articulatory errors embedded in a pattern of speech made slow and effortful by trial error groupings for the desired articulation patterns (p. 267).

Inherent in these definitions is the implicit assumption that each disorder is a distinct clinical entity. As Deal and Darley (1972) have indicated, however:

. . . occurrence of apraxia of speech in 'pure' form is relatively infrequent. It often occurs concomitantly with aphasia or dysarthria, or both, as well as in conjunction with an oral-facial apraxia (p. 640).

This view is supported by numerous authors (Darley, Aronson, and Brown, 1975; Shankweiler and Harris, 1966; Johns and Darley, 1970; Rosenbeck, Wertz, and Darley, 1973; DeRenzi, Pieczero, and Vignolo, 1966; and Skelly, 1974). Goodglass and Kaplan (1963) stated that aphasics have a gestural deficiency which is best understood as:

. . . an apraxic disorder consequent to a left hemisphere lesion. That is, the existence of an apractic disorder will be encountered frequently in association with aphasia, not through a causal relationship, but because of the contiguity of the pathways involved (p. 704).

In this investigation, as in Skelly's (1974) study of Amerind use with severe oral and verbal apraxic patients, apraxia of speech (oral-verbal apraxia or verbal apraxia) refers to an impairment in sequencing of volitional articulatory movements. Oral apraxia refers to impairment in ability to accomplish sequencing of volitional movement of oral structures. Since the literature suggests the possible concurrence of aphasic, dysarthric, and apraxic symptoms in a single patient, an attempt should be made in studies dealing with subjects characterized as having aphasia compounded by severe oral and verbal apraxia, to identify dysarthric symptoms, when present.

Nonvocal Communication Techniques with Severely Impaired Speech and/or Language Individuals

Use of alternative (nonvocal) communication systems by Speech-Language Pathologists has been limited due to traditional clinical emphasis on eliciting verbal productions. McDonald, as reported by Archer (1977), indicated an increasing awareness among educators and Speech-Language Pathologists of the importance of functional communication skills to overall development--social, cognitive, and emotional, as well as speech and language development. Recently, there have been several research studies utilizing nonvocal communication techniques as an alternative and/or supplemental means of communication for severe communicatively handicapped individuals. These were individuals who exhibited essentially limited or no functional verbal communication skills after a period of traditional speech-language training. Utilization of a nonspeech response mode allowed these non-verbal individuals an alternative/augmentative method of communication when verbal communication was impossible.

Nonverbal communication systems as alternative/augmentative means of communication have been utilized with varying degrees of success with different nonvocal populations. They include hearing impaired, mentally retarded, autistic, and cerebral palsied individuals.

Hearing Impaired

The most obvious and widely known nonvocal communication technique is manual communication. This would include American Sign Language (ASL) or Ameslan (Fant, 1972), Signing Exact English (Gustason, Pfetzing, and Zawolkow, 1972), Seeing Essential English (Anthony, 1966; 1971), and Systematic Sign Language (Paget and Gorman, 1968). These manual communication systems provide a basis for language acquisition for the hearing impaired child and allow a functional means of communication where aural/oral language has failed or needs to be supplemented. Research studies on use of manual communication systems with hearing impaired populations are so numerous, total citation of this literature is prohibitive. The reader is directed to Wilbur (1976), and Moores (1974), for comprehensive reviews of the consideration and use of manual communication systems. Justification for use of manual communication systems is presented in studies by Power (1974), and Moores (1971, 1974), as cited by Wilbur (1976). Wilbur cites:

. . . the lack of direct evidence that use of manual communication is in fact detrimental to the development of speech skills. If such an interference relationship exists, one would expect to see it reported in study after study. Its absence is thus noteworthy (p. 479).

It is only natural for clinicians to turn to nonoral means of communication when faced with normally

hearing, nonverbal individuals for whom all attempts at establishing oral language have been less than successful. This alternative was considered by Mayberry (1976), who discussed some factors relative to the clinician's decision-making process in instituting sign language as an alternative communication system. Using sign language as a means of establishing communication in the normally hearing client for whom all else has failed--as with individuals with autistic, mentally retarded, and cerebral palsied symptoms, was considered. Mayberry also provided information on various manual communication systems, appropriate selection of a manual system, and the methods for teaching sign language.

Mentally Retarded

Excluding the profoundly hearing impaired, use of nonspeech communication systems with individuals who have severe communication impairments has become widely used. Mentally retarded children with essentially no functional verbal communication skills have achieved success in learning nonvocal communication systems (Premack and Premack, 1974; Bricker, 1972; Levett, 1972; Carrier and Peak, 1975; Peak and Carrier, 1973; Scheifelbusch and Lloyd, 1974; Kopchick et al., 1975; Kopchick and Lloyd, 1976; Sutherland and Beckett, 1969; Berger, 1972; LaCroix and Carrier, 1973; Kent,

1972; Hodges and Deich, 1978; Critcher et al., 1973; Carrier, 1974a, 1974b; Carrier, 1976; Brookner and Murphy, 1975; Vicker, 1974; Kuntz, 1974; Miller and Miller, 1973). Premack's work (1970, 1971; Premack and Premack, 1972, 1974) with a nonspeech language system is based on his teaching a chimpanzee to learn language through an analytical system using movable plastic chips. The chips had different shapes, each representing a word or functioning as a symbol (Carrier, 1976). This provided the chimp with a set of symbols which could function as a means of communication. Carrier (1976) reports Premack's hypothesis that:

. . . if a chimp had the potential for learning language, even though it might not be able to learn speech, it might be able to learn to use the plastic shapes as words and might be able to learn to manipulate them in accord with the linguistic rules more commonly associated with spoken symbols (p. 526).

Carrier and Peak's (1975) Non-Speech Language Initiation Program (Non-Slip) is a programmed training technique for children who may not experience success in traditional speech-language training programs. Non-Slip, as Carrier (1976) indicates, is designed to:

. . . teach a set of conceptual skills necessary for acquisition of functional linguistic communication. . . focuses on teaching a child tactics for learning language rather than teaching a circumscribed set of functional communicative responses (p. 529).

Non-Slip symbols consist of 20 nouns, five verbs, three prepositions and the words "the" and "is." The movable plastic chips made of different abstract shapes function as symbols for communication in a manner similar to the use of written words on cards. Studies by Premack and Premack (1974), Carrier (1974a, 1974b; Carrier and Peak, 1974; Peak and Carrier, 1973), and those previously cited, aptly demonstrate that severely and profoundly retarded children who evidence essentially no functional verbal communication skills are able to acquire an alternative/augmentative communication system. The underlying reason for successful acquisition of these nonvocal symbol systems is that ability to attain a functional linguistic communication system is not solely dependent on a verbal set of symbols. As Carrier (1976) states:

. . . spoken symbols, although basic to most human communication and basic to most training goals, are little more than one of numerous symbol sets that can be used to teach communication (p. 527).

Autistic

Nonvocal response modes have been utilized successfully with mute autistic children. Bonvillian and Nelson (1976) discussed progress made when a mute autistic boy was taught American Sign Language (ASL). They stated that over a six-month period, the child learned and spontaneously used a total of 56 different

signs. The word combinations that he formed paralleled early language development. McLean and McLean (1974) demonstrated successful acquisition of a symbol system similar to Carrier and Peak's (1975) Non-Slip training, with two nonverbal autistic children who had made no progress during a number of years of a traditional speech-oriented program. These authors concluded that success in this particular expressive language training program was a function of:

. . . reducing response demands on the child by eliminating the requirement of vocal speech production . . . because this symbol system does not require that the child actually construct each response unit and retain each part of the sentence sequence in his memory, it is considerably less complex than even a manual signing or fingerspelling system (p. 192).

Cerebral Palsy

A major group for whom nonvocal response modes have been developed as an alternative/augmentative communication system, is severe cerebral palsied persons. These individuals typically display an inability to communicate because of the extent of neuromuscular involvement which inhibits control of respiratory, phonatory, and/or articulatory musculature. Mental retardation also may accompany the cerebral palsy disorder. For these severe communicatively handicapped individuals, traditional management oriented toward establishment of intelligible speech is not always a

realistic management goal. Hagen et al. (1973) demonstrated that in situations where the patient's "muscular impairments" and "mental capacities" could not be modified to the degree that would make spoken speech a feasible communication skill, a nonvocal system of communication could be acquired and implemented with a relative degree of success. In a number of other studies with severe cerebral palsied individuals (Sayre, 1963; Wendt, Sprague and Marquis, 1975; McDonald and Schultz, 1973; Vanderheiden and Grilley, 1976; McDonald, 1976; Goldberg and Fenton, 1960; acquisition of an alternative/augmentative communication system has been demonstrated. In addition, these studies have indicated that use of a nonspeech response mode has provided a functional communication system for these essentially nonvocal individuals.

Due to the almost exclusive use of Blissymbolics with severe cerebral palsied individuals, a comprehensive discussion of its utilization with this population will be provided in the section on the Bliss symbol system.

Bliss Symbol System

The nonvocal communication technique utilized in this investigation is the Bliss symbol system (or Blissymbolics), formerly called Semantography (Bliss, 1965). The following discussion of the Bliss symbol

system includes description, criteria for utilization, use with cerebral palsied individuals, and summary of the Bliss symbol program.

Description of the Bliss Symbol System

Charles K. Bliss, a former Australian engineer, designed and developed the Bliss symbols as an international symbol system that would serve as a universal language or a ". . . bridge between meaning and traditional orthography" (McNaughton, 1976, p. 85). Because Bliss attempted to create an international language which could be utilized by people around the world, acquisition of the Bliss symbol system had to be easy for most individuals. An excellent description of the origination and philosophy behind the development of Blissymbolics is provided by Bliss (1965), Clark and Woodcock (1976), McNaughton (1975, 1976), Ontario Crippled Children's Centre (OCCC) (1973, 1974), Harris-Vanderheiden et al., (1975), Vanderheiden and Harris-Vanderheiden (1976), and Archer (1977). For purposes of this study, Clark and Woodcock's (1976) description of the system has been accepted:

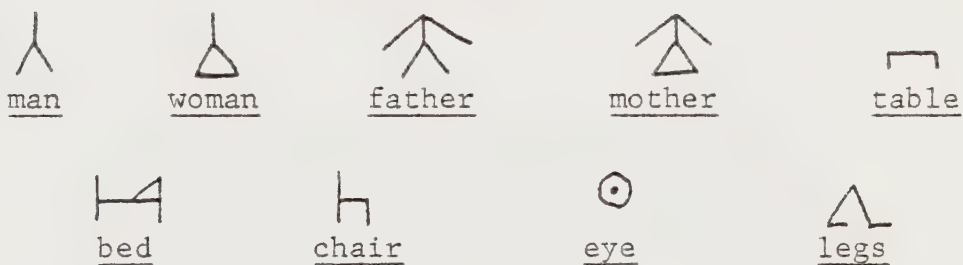
Bliss Symbols were patterned after written Chinese which allows people of different spoken Chinese dialects to communicate using a common symbolic language . . . formerly called semantography because it was based on symbolic logic, semantics, and ethics. The symbol combinations frequently represent more than one word, making the system

logographic in the same way as Chinese characters, which are ideational combinations of 1500 or so basic symbols (p. 592).

Bliss symbols are logographic because they represent words or ideas rather than phonemic units. This logographic system is composed of pictographic (concrete) symbols as well as nonpictographic or ideographic symbols (abstract). By pictographic is meant that the symbol itself looks like what it represents; hence, "picture-like." Ideographic symbols represent an idea or a concept (Vanderheiden and Harris-Vanderheiden, 1976).

The following examples of Bliss symbols and symbol concepts have been abstracted from the OCCC's Teaching Guidelines (1974):

PICTOGRAPHIC



IDEOGRAPHIC



The Bliss symbol system is composed of approximately 100 elements which are combined in various ways to form a symbol. As McNaughton (1976) explains:

Bliss began with numbers and mathematical symbols he devised himself. Symbols are based upon meaning and therefore symbols which deal with a similar topic have common components (p. 94).

Bliss distinguishes between nouns, adjectives/adverbs, and verbs by utilizing "special indicators." The special indicator for nouns is the "chemical thing" symbol. An "evaluation" symbol, or an upright V over a symbol, indicates an adjective or a verb. An "action" indicator, an inverted V over a symbol, is used for verbs.

□	▽			
<u>thing</u>	<u>making descriptive</u>	<u>opening</u>	<u>to open</u>	<u>open</u>

Concepts of time are explained by Archer (1977) when she stated that they:

. . . are derived from an analogy with a parabolic mirror. Thus, the past is indicated by a mirror looking back, 'mirroring the past'; while the future is a mirror looking forward, 'focusing the future'. The present is the period in time between the past and the future (p. 569).

)	)(	(
<u>time past</u>	<u>time present</u>	<u>time future</u>

When the present tense is desired, only the action indicator is needed above the symbol. If the past or

future tense is desired, then the past or future indicator is used in place of the action indicator.

 <u>walk or is walking</u>	 <u>was walking or walked</u>
 <u>will be walking or will walk</u>	

Accuracy in writing the symbols is very important. Symbols will vary in meaning depending on their position. Consider the following Bliss symbols and explanation of their position provided by McNaughton (1976):

 <u>earth</u>	 <u>sky</u>	 <u>world</u>	 <u>water</u>	 <u>cloud</u>	 <u>much</u>
 <u>lake</u>	 <u>ocean</u>	 <u>rain</u>	 <u>snow</u>	 <u>fog</u>	

If a straight line is at the bottom of the space, it represents 'earth'; if at the top, 'sky.' With both lines, it represents the space between the sky and the earth, or the symbol for 'world.' Water in this position is water in general. The symbol for water at the skyline, is 'clouds.' Water at the baseline plus the symbol for 'much' represents 'lake.' The symbol for 'lake' plus two multiplication signs indicates 'ocean.' Water coming down in direction of the arrow represents 'rain.' If the arrow is in the shape of a star, it is 'snow.' Water under the sky is 'fog' (p. 98).

In addition to horizontal and vertical positions, symbol size also will change the intended meaning.

 <u>sun</u>	 <u>mouth</u>	 <u>day</u>	 <u>food</u>
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Techniques for expanding vocabulary use as seen by presentation of the 100, 200, and 400 word Bliss symbol vocabulary displays are available (OCCC, 1974). Management guidelines for these vocabulary expansion techniques are provided by the OCCC (1974) and the Blissymbolics Communication Foundation (1975). As one can observe, however, the possibilities for providing nonvocal individuals with the opportunity to communicate on the greatest variety of topics is a realistic management goal. As Archer (1977) indicated, ". . . variations in position, size, and number permit production of an infinite number of symbols and thus, a very complete communication system" (p. 569).

It is important to note at this point that there is a distinct advantage in using Bliss symbols as opposed to other systems utilizing pictographs, often referred to as rebuses. These would include "The Symbol Source-book" (Dreyfuss, 1972), "The Standard Rebus Glossary" (Clark, Davies and Woodcock, 1974), "The Rebus Reading Series" (Woodcock, 1965), "Signs and Symbols Around the World" (Helfman, 1967), and MELDS (Clark et al., 1975). The Bliss symbol system is similar to these picture systems in the use of "generalization" which provides a wider range of communication with a specified number of symbols. However, Bliss symbols can utilize generalization more effectively and can depict more concepts

and abstractions " . . . because the symbols are idea-based instead of object-based as are other picture systems . . . " (Vanderheiden and Harris-Vanderheiden, 1976, p. 636). While the Teaching Guidelines prepared by the Ontario Crippled Children's Centre (1974) for the Bliss symbol communication system will be described in the methodology section, it should be mentioned that every symbol is displayed with the printed word representing the basic meaning of the symbol directly underneath it. This is to allow people unfamiliar with the system to communicate freely with someone who uses Blissymbolics.

Criteria for Utilization of the Bliss Symbol System

Prior to institution of any nonvocal communication system for the non-verbal individual (including Blissymbolics), several important questions must be considered. Foremost, it is necessary to answer the question of whether traditional speech-language response modes have failed or are considered less than effective and the individual is lacking an effective means of communication. Further considerations include acceptability of the symbol system to patient and family, and the symbol system's appropriateness to present level of expressive language abilities. These are discussed by several authors (McNaughton, 1975; 1976; Vanderheiden, 1976; McDonald, 1976; OCCC, 1973; McNaughton and Kates, 1974;

Vicker, 1974; Vanderheiden and Harris-Vanderheiden, 1976; Kopchick and Lloyd, 1976).

An additional and somewhat crucial concern that must be considered in this investigation as well as any investigation where an alternative/augmentative non-vocal communication system is implemented in clinical management, is whether vocalizations presently existing will either decrease or be eliminated. As indicated by Vanderheiden and Harris-Vanderheiden (1976), studies to date have shown that introduction of nonvocal communication techniques have not decreased functional vocalization or speech development but have in many instances increased attempts at vocalization and resulting intelligibility (McNaughton and Kates, 1974; McDonald and Schultz, 1973; Vicker, 1974; Harris-Vanderheiden et al., 1975; Vanderheiden, 1976).

Use of Blissymbolics with Cerebral Palsied Individuals

Bliss symbols were effectively used as an alternative/augmentative communication system for five nonvocal severely mentally retarded children with cerebral palsy at Central Wisconsin Colony (Harris-Vanderheiden et al., 1975). Prior to implementation of the Bliss symbol program, the authors reported that the childrens' total communicative skills consisted of yes/no gestures, undifferentiated vocalizations, and/or a very limited number of intelligible utterances such as "yes, no,

hello, goodbye." Traditional language programs had been attempted with the children prior to Bliss symbol training. Utilization of a vocal response mode resulted in essentially minimal or no success. The choice of Blissymbolics instead of other nonvocal communication techniques was due to the children's severe motoric impairments. In the initial pilot program, involving 20 hours of teaching time, the severely retarded cerebral palsied children learned from seven to 50 symbols each and had begun to use symbols both to respond to questions and to initiate simple symbol sentences spontaneously (Vanderheiden and Harris-Vanderheiden, 1976).

Hammond and Bailey (1976) also have demonstrated success with Bliss symbols in increasing functional communication skills with four severely impaired cerebral palsied children, all of whom had little or no voluntary vocalizations and varying degrees of gesturing ability. Utilization of Blissymbolics as an alternative/augmentative symbol system for the severely handicapped nonvocal and nonreading child was initiated by Shirley McNaughton at the Ontario Crippled Children's Centre (OCCC) in October of 1971. As indicated by McNaughton (1976), the basic rationale for utilizing the Bliss symbol communication system with these children instead of teaching them to read was the importance of providing the child with an effective functional method of communication as expeditiously as possible. Since it was

demonstrated that acquisition of Bliss symbols was easier than acquisition of traditional orthographic symbols, these children were provided a functional means of expressing their needs, thoughts, emotions, humor, etc. Research at the OCCC (McNaughton, 1975; 1976; McNaughton and Kates, 1974; OCCC, 1973) has provided substantial data relating to the successful acquisition of Bliss symbols as a compensatory communication system.

Summary of Bliss Symbol Programs

Although Blissymbolics has been utilized as an alternative/augmentative communication system only since 1971, successful implementation of this nonvocal response mode has been demonstrated. Presently, there are over 1000 children and adults using Bliss symbols throughout the world (Blissymbolics Communication Foundation, 1977). The investigations reviewed are judged by the writer to support utilization of this rehabilitation program for those populations lacking functional verbal communication skills. Further supportive evidence has been noted by Archer (1977). She reported that: " . . . a 13 year old cerebral palsied boy learned 600 symbols in a year and communicates in complete sentences but had virtually been unable to learn to spell or read" (p. 587). The obvious advantage of using Bliss symbols is that an essentially nonverbal individual is provided a means of functional communication. Archer (1977) offered

additional evidence for implementation of the Bliss symbol communication system:

In addition to providing a functional communication system, a number of other benefits have also been observed . . . children have displayed significantly increased vocalization and verbalization . . . More accurate and extensive language, and psychological and psychiatric assessments have been attained . . . the child and his family were able to achieve a more honest and meaningful relationship, and the child was able to achieve a more mature emotional status (p. 577).

Because there has been only a recent interest in the implementation of Blissymbolics, available literature on this nonvocal response mode is limited. Most of the research has been conducted with mentally retarded and cerebral palsied children who exhibit varying degrees of cognitive abilities, although other nonvocal communicatively handicapped individuals are being exposed to the program. In the majority of cases, the essentially nonverbal individual is provided with a functional communication system. In order for educators and Speech-Language Pathologists to comprehend the "full potential and applicability" of using Bliss symbols as an alternative/augmentative communication system, documented clinical experiences and formal research investigations are needed (Archer, 1977).

Nonvocal Communication Techniques With Severely Impaired Aphasic and/or Apraxic Individuals

Studies involving nonvocal response modes with the aphasic population are relatively few in number. Carrier (1976) reports successful acquisition of the Non-Slip program with a small number of adult aphasics. Artificial language training using the design of Premack's program with chimpanzees was utilized with seven global aphasics (Glass, Gassaniga and Premack, 1973). As in Carrier's Non-Slip program, plastic chips with different shapes and colors were used to represent different lexical items. The results of this particular investigation demonstrated that " . . . global aphasics could utilize this artificial language system to attain linguistic skills ranging from the expression of relations between objects (same-different) to simple statements of action (subject-predicate-direct object)" (Reichle et al., 1977, p. 42).

Gardner et al. (1976), in a study of visual communication techniques with aphasics, successfully demonstrated acquisition of a nonspeech symbol system as an effective management approach for teaching adult aphasics. A most important investigation, and one which served as primary motivation for the present study, involved programmed training of a nonspeech response mode with a severe expressive aphasic presenting a

severe oral apraxia (Reichle et al., 1977). The non-speech response mode utilized in this study incorporated a portion of the Non-Slip program described by Carrier (1974). Results indicated that a severely impaired expressive aphasic exhibiting severe oral apraxia who had failed prior traditional speech and language training could be trained to increase expressive vocabulary and syntactic skills.

In another definitive study, Skelly (1974) demonstrated successful acquisition of the nonspeech response mode of Amerind (American Indian Sign Language). It was used as a facilitator of oral verbalization for six oral and verbal apraxics without symptom of aphasia. All six patients in this study had no functional speech on admission to the project. All mastered 50 signs the first two months, easily interpreted over 200 signs, developed some spontaneous oral verbal productions, and made progress in using speech accompanying the signs.

The results of a number of investigations have confirmed the necessity of developing alternative/augmentative nonspeech response modes with aphasics who have been unable to develop functional communication skills with traditional forms of therapy (Hurwitz, 1973; Green, 1974; Chester and Egolf, 1974; Reichle et al., 1977).

The previously cited studies, particularly that

by Egolf and Chester (1974), present major reasons for incorporating a nonverbal communication component into aphasia management. All indicated that providing the aphasic with an efficient communication system is essential to aphasia rehabilitation. In addition, results of the investigations suggested that utilization of a nonverbal response mode will facilitate and complement the returning of linguistic skills.

At this point in time in research on nonvocal communication techniques, utilization of Bliss symbols with nonverbal adult aphasics has not been documented. In a letter from McNaughton (Appendix A), it was indicated that the Blissymbolics Communication Foundation was aware of only one rehabilitation program offering Bliss symbol instruction to nonverbal aphasics. Hemi/Sphere, a continuing management program for stroke patients and their families, provides for stabilization and maintenance in the stroke patient's recovery (Gregory, 1976). A team approach is utilized in Hemi/Sphere, led by a physiatrist and coordinated by an occupational therapist. Other team members include a medical resident, kinesiologist, consultant physiotherapist, a volunteer, the stroke participant and spouse. The Hemi/Sphere program meets three times per month for approximately two and a half hours each time and an attempt is made to provide moderately involved

stroke patients with encouragement, support, and an opportunity to learn new activities. In addition to woodwork, crafts, baking, typing, and painting, instruction in Blissymbolics is made available (Gregory, 1976).

Although Bliss symbol instruction is provided in the program just described, it is administered by occupational therapists who usually are not trained in language management. Information on the success of these ongoing clinical experiences with stroke patients is not available. Research utilizing this alternative/augmentative communication system with adult aphasics still is needed in order to evaluate more accurately the efficiency of a nonspeech response mode with this population.

Summary and Statement of the Problem

Summary

In view of the fact that there are limited data on nonvocal rehabilitative techniques with nonverbal adult aphasics with severe oral and verbal apraxia, there is a need to determine whether an alternative/augmentative communication system can improve overall functional communication skills for those persons. Present speech-language rehabilitation programs designed to return essentially nonverbal apraxic-aphasics to communicative efficiency require vocal responses

as the basis for management. Many adult aphasics with the complication of the motor speech impairment of apraxia, demonstrate minimal or no progress in these traditional speech-language programs. It is possible that the major reason for failure is that the responses required in speech-language training are too difficult for the severe motorically impaired aphasic. Verbal and graphic modality responses require a complex sequencing of motor movements which the nonvocal apraxic-aphasic is not capable of accomplishing. Management programs requiring these complex motor movements may well be unsuccessful in demonstrating appreciable changes in functional communication skills.

A logical approach to alleviate this problem is to provide an alternative nonvocal response mode that will serve as a supplement to the aphasic's present limiting communication skills. The feasibility of utilizing a nonvocal response modality as an alternative/augmentative management technique has been adequately demonstrated. Several researchers have used different nonvocal communication systems, e.g., ASL, Amerind, SEE, plastic chips, or rebuses (picture systems), with severe communicatively handicapped children and adults with varying degrees of success. The major disadvantage to these types of nonspeech response modes is that in order to communicate with the patient, familiarity

with the system is necessitated. To provide the aphasic who has essentially no functional verbal communication skills with a functional communication system, is essential to any management program. Replacing the traditionally required speech responses with a nonspeech response mode is considered a logical management approach when minimal or no appreciable changes in functional communication skills have been evidenced. A 20 hour speech-language training program was utilized for the introduction and implementation of the Bliss symbol system with the purpose of increasing communication possibilities for the nonverbal apraxic-aphasic. The universality of this symbol system is due to the fact that the English word corresponding to the meaning of the symbol is written directly underneath. One who can read is capable of understanding the system with no prior knowledge of the Bliss symbols required.

The potential implications of the above information for aphasia management are obvious. The results of this investigation are intended to provide needed information on the effectiveness of implementing a nonvocal response mode with nonverbal apraxic-aphasic patients, who had exhibited essentially no appreciable changes in functional communication skills with traditional management approaches.

Statement of the Problem

Based on the previous review of literature, the purposes of the investigation are as follows:

1. To assess the number and rate of Bliss symbol acquisition of aphasic individuals with severe oral and verbal apraxia, as well as their ability to integrate symbols into syntactically and semantically correct linguistic responses; and to report the number of intelligible verbal responses tabulated daily for each subject.
2. To assess such changes in speech-language functioning as may occur concurrent with Bliss symbol acquisition, as measured through pre- and post-Overall and subtest scores on the Porch Index of Communicative Abilities (PICA), and the overall score on the Functional Communication Profile (FCP).
3. To assess through pre- and post-management interviews with an individual in the aphasics' immediate living environment, qualitative changes in non-speech-language behaviors that may have developed concurrent with Bliss symbol acquisition.

PICA test scores will be tested for significance using a single-classification ANOV for repeated measures, and the FCP overall scores using a Wilcoxon signed-ranks test. The required alpha level will be .05. Other data will be treated descriptively.

METHODOLOGY

The research method will be described in the following sequence: general procedures; subject identification and selection; testing materials and interview procedures; and, data reduction and analyses.

GENERAL PROCEDURES

A Bliss symbol communication training program was implemented with three adult males and one adult female aphasic individuals with severe oral and verbal apraxia. Evaluation of the aphasics' skill in acquiring this nonvocal response mode was assessed by determining: (a) number of Bliss symbols acquired at the end of 20 hours of management, (b) rate of Bliss symbol acquisition (daily, weekly, and cumulative bases), and (c) number of symbols used in generating syntactically and semantically correct linguistic responses. In addition, pre- and post-management comparisons of speech-language behaviors were made using the following tests:

1. Porch Index of Communicative Ability (PICA)
 - (a) Overall Score
 - (b) Gestural Modality Response Level Score
 - (c) Verbal Modality Response Level Score
 - (d) Graphic Modality Response Level Score
2. Taylor's Functional Communication Profile
 - (a) Overall Score

In this study, all pre- and post-testing and interviews, as well as implementation and management of the Bliss symbol communication system, was conducted by

the investigator, with the exception of administration of the PICA which was administered by M. Wittenbach.

Each subject had had a previous period of speech-language management utilizing a speech-response mode, but at the time the training was initiated, exhibited limited or no functional verbal communication skill. Subjects acted as their own controls.

The Bliss symbol communication system was taught according to the Teaching Guidelines developed by McNaughton at the OCCC (1974). Incorporated in the present study however, was La Pointe's (1977) Base 10 programmed stimulation design for aphasia management. This design allowed for task specification, scoring, and plotting aphasic's performance in a management program on a session-by-session basis. Descriptions of daily and weekly gains were obtained through use of this management design. Each session was 50 minutes in length and each subject was seen three times per week, providing a total training time of 20 hours.

In an attempt to interpret more comprehensively the outcome of Bliss symbol acquisition and functional use of the symbol system outside the management session, changes in non-speech-language behaviors were assessed through pre- and post-management interviews, with the same individual in the aphasic's immediate living environment.

Subject Identification and Selection

Subjects were available adults exhibiting aphasia compounded by oral and verbal apraxia. Dysarthric symptomatology was identified, if present, since the possibility exists that some degree of dysarthria may co-exist with disorders of aphasia and apraxia. On entrance to the program, subjects exhibited essentially limited or no functional verbal communication skills, i.e., no functional speech. Spontaneous vocalizations generally were unintelligible, characterized by varying degrees of phoneme production or minimal, repetitive, undifferentiated sounds, e.g., "no-no-no." Gross gestures, i.e., head nodding for "yes"/"no," or pointing, were evidenced along with vocalization attempts. All had a previous period of traditional speech-language management which utilized a speech-response mode. The subjects were chosen from in and around Wichita, Kansas. Upon receiving permission for possible participation in the study from all involved parties, including nursing home administrator, family physician, responsible family member where applicable, and the individual patient, subjects were screened. For examples of each of the permission forms used, see Appendix B.

Subjects were required to meet the following selection criteria:

1. Monolingual native speakers of English.
2. Normal intelligence prior to cerebral insult as suggested by occupational and/or educational histories.

3. Evidence of oral and verbal apraxia as demonstrated by low verbal scores on the PICA, low speaking scores on the FCP, and an informal evaluation of apraxia as suggested by Darley, Aronson, and Brown (1975).
4. No evidence of manual apraxia, and agnosia (visual, auditory, tactile) as determined through clinical evaluation by the investigator, according to suggestions by Eisenson (1971). No auditory or visual acuity problems not compensated by corrective lenses and/or hearing aid; and a hearing level contour that meets required minimum hearing levels for subject's age (Maurer and Rupp, 1979).
5. Good, general physical health, regardless of age, as determined by medical examination in order to meet the needs of the required management tasks. This included the ability to physically point to stimulus items. In order to insure good physical health, an attempt was made to find subjects below the age of 70.
6. Be sufficiently motivated to learn the Bliss symbol communication system, as determined by the investigator's initial diagnostic interview with subject and an individual in the subject's immediate living environment.
7. Demonstrate mild, moderate, or severe receptive aphasia disturbance as determined by results on De Renzi and Vignolo's (1962) Token Test.

Initial Rating of Type and Severity of Aphasia

A subject's initial performance on all 18 subtests (eight gestural, four verbal and six graphic) of the Porch Index of Communicative Ability (PICA) constituted the experimental measure for the initial rating of type and severity of aphasia. According to Porch (1973), aphasics exhibiting severe formulation difficulty (apraxia) have characteristic modality response contours

(see Appendix C). The verbal modality responses result in "disproportionately low" verbal scores compared to gestural modality responses. Scores in the graphic subtests are slightly higher than the verbal scores, however, are much lower than the gestural modality responses (Porch, 1973).

DeRenzi and Vignolo's (1962) Token Test was administered to all subjects in order to evaluate the presence and degree of receptive disturbance. Overall functional communication skills were measured through use of Taylor's Functional Communication Profile, and reflected by the overall score on this scale.

Case Study Information

Case studies were done for each subject to obtain necessary additional information. The following information was taken from each subject's medical history and the initial diagnostic interview, and is summarized by subject in Appendix D.

1. age
2. sex
3. occupation level
4. educational level
5. etiology of cerebral insult, e.g., vascular, trauma, infection, or neoplasm
6. extent of lesion
7. previous extenuating medical circumstances, e.g., number of CVA's and time elapsed between them
8. presence of hemiplegia, paresis, and/or visual field deficits, e.g., a right homonymous hemianposia
9. description of previous speech-language management, e.g., amount, type, time of initiation

Testing Materials and Interview Procedures

Testing Materials

The Porch Index of Communicative Ability (PICA), as suggested by Darley (1972), has been demonstrated to be a highly sensitive and reliable tool for the assessment of change in language ability in the adult aphasic population. The PICA is a clinical tool designed to:

. . . assess and quantify certain verbal, gestural and graphic abilities. . . Through its use, the clinician may obtain general and specific levels of output ability and make inferences about input and integrative ability (Porch, 1973, p. 1).

Patient's responses are scored through a multi-dimensional scoring system on the 18 subtests (eight gestural, four verbal and six graphic), which constitute the Index. The multidimensional scoring system consists of sixteen categories which encompass five dimensions: accuracy, responsiveness, completeness, promptness, and efficiency. The Overall score, an average of all subtest means, is the " . . . best single index of the patient's general communicative ability" (Porch, 1973, p. 70). However, Overall score does not indicate the methods by which the patient communicates. Therefore, evaluation of the individual modality response level scores provides information relative to how well the patient responds gesturally, verbally, and

graphically. Porch (1967) has reported significantly high test-retest reliability coefficients for the Overall score as well as each modality response level scores: Overall (.98); Gestural (.96); Verbal (.99) and Graphic (.96). Several validity measurements have been reported, including coefficients for the inter-relationship of subtest scores, anticipating that since all subtest scores reflect communicative skills, a positive correlation should exist. Results have indicated that all subtests were positively correlated, and were significantly different from no relationship (.01 level). Additional reliability and validity measurements are reported by Porch (1964). Critical to the usefulness of the PICA as a sensitive and reliable measure of change in language capabilities is the reliability of the tester. Porch (1973) has indicated that " . . . in the hands of a well-trained tester, this battery (the PICA) and the aphasic patient yield consistent results" (p. 1). Martha Wittenbach, Speech-Language Pathologist at Wesley Medical Center, has been trained in the administration of the PICA and agreed to perform the pre- and post-PICA's on all four subjects. A statement relative to Ms. Wittenbach's PICA training and reliability as a tester is presented in Appendix E, and was provided by R. Kukol. The PICA was administered under standard conditions and according to recommended test protocol.

Taylor's (1963) Functional Communication Profile (FCP) was designed to assess the communicative ability of adult aphasics in everyday situations, as opposed to the traditionally structured "task-oriented" aphasia evaluations. Typically, standardized aphasia tests do not accurately evaluate an individual's functional utilization of his communication skills. Although an aphasic's ability to verbally express himself is impaired, other modalities, such as graphic and gestural skills, might be intact in varying degrees. As Taylor (1964) states:

The Profile attempts to rate those dimensions of communication performance which are not usually accounted for in language tests The basis for scoring is derived from actual use of language skills in a natural context of use, as opposed to the test situation (p. 181).

The FCP is composed of a 50 item list encompassing "common language functions" of daily living (Taylor, 1964). This list is divided into five communication modalities: movement (gestures), speaking, understanding, reading, and a category termed "other" which includes time orientation, writing, and mathematical skills.

Administration of the FCP requires an informal, unstructured interview situation where the aphasic is unaware that he is being tested and scoring is postponed till after interview. In cases where aphasics exhibit

a severe expressive deficit, additional information regarding the patient's attempts at communication and their communicative effectiveness may be required from family members or other individuals in their immediate environment. The relaxed communication setting allows the tester to explore the aphasic's present functional use of his existing communication skills. Functional in this diagnostic setting means " . . . without cues, assistance or artificial conditions . . . and should reflect the patient's voluntary control, in the course of daily life, over each behavior listed" (Taylor, 1975, p. 15).

The examiner must only score directly observed communicative skills, not what the aphasic has potential to do. Each behavior is scored multidimensionally, i.e., in terms of accuracy, consistency, speed, fluency, intelligibility, and frequency of use. Observed communicative skills are then rated on a nine point scale/continuum ranging from normal, good, fair, poor, to not present. Taylor (1975, p. 16) provides the following guide relative to the meaning of Normal, Good, Fair and Poor.

All of Poor	25%
All of Fair	50%
All of Good	75%
All of Normal	100%

It should be noted that a rating of "normal" is indicative of pre-morbid communicative efficiency.

A score for each of the 50 items is calculated, the points are summed and then converted to a percentage for each modality. An overall score is derived by adding each of the five modality scores and is considered by Taylor " . . . a single measure of an individual's communicative effectiveness in everyday life" (1964, p. 182). Additional corroboration for the usefulness of the overall score is supplied by Vignolo (1964) who considered it representative of the subject's "overall verbal effectiveness" in everyday life.

Inter-rater reliability for the FCP was studied by Taylor and Sands (1965) and is reported by Taylor (1975):

The degree of the agreement among raters was analyzed through the use of the Kendall Coefficient of Concordance and was expressed in terms of Spearman Rank-order correlations (r). Specifically, an r of .95 was obtained for the FCP Movement Score; an r of .92 was found for the Speaking Score; an r of .95 was derived for the FCP Understanding Score; an r of .87 was obtained for the FCP Other classification; and an r of .95 was obtained for the FCP Overall Score (p. 23).

Taylor (1975) also cited several inter-rater and test-retest reliability studies reported by Greenberg (1966; 1969) which corroborated Taylor and Sands' investigations concerning the reliability of the FCP.

Numerous validity studies of the FCP as an assessment of functional communication ability have

been conducted and results indicate the utility of the FCP as a valid clinical tool. For example, in one experiment where five Speech Pathologists rated 100 FCP's with respect to the overall communicative effectiveness represented by each score, an intra-class validity correlation coefficient of .94 was reported (Taylor, 1975). For a complete listing of the reliability and validity studies of the FCP, the reader is directed to Taylor (1975).

It is important to note that prior clinical experience with the adult aphasic population is highly recommended for those clinicians administering the FCP, in order to insure validity of test measurements. The pre- and post-FCP was administered by the investigator who had several hundred clinical hours with the adult aphasic population prior to the testing. The FCP was conducted under standardized test conditions.

DeRenzi and Vignolo's Token Test (1962) is a test sensitive to mild receptive disturbances in aphasia. According to the authors, it is especially designed for aphasic patients whose receptive disorders seem very slight or altogether absent. This would be characteristic of mild sensory aphasics or motor aphasics with a defect limited to the expressive modality, and when the receptive losses may not be apparent in the usual clinical examination. The

patient must make visual associations between tokens of two different shapes, two different sizes, and five different colors. A gestural response is required, such as picking up, touching, or moving one of the tokens, in response to the auditory stimulus provided by the tester. As the Token Test progresses, the tasks become increasingly more complex. Several reliability and validity studies on the Token Test have been conducted. One such study which used 57 aphasics and 63 non-aphasic brain damaged patients, confirmed the discriminating power of the Token Test. Ninety-one percent of aphasics were correctly classified and only five percent of the non-aphasics were misclassified, applying the cut-off score of 23 errors (Hartje et al., 1973). As Eisenson (1971) indicated, the Token Test is an " . . . important clinical instrument for the assessment of verbal comprehension through nonverbal simple performance behavior" (p. 1238). This recognized test is used extensively as a diagnostic measure "with great sensitivity" to detect receptive disturbances in aphasia (DeRenzi and Vignolo, 1962).

The above tests were selected as diagnostic measures for two reasons: first, for appropriateness of usage in the field of diagnostic aphasia testing; and secondly, since they represent standardized and reliable measures of communication behavior.

Interview Procedures

An initial diagnostic interview with each subject, and with an individual in the patient's immediate living environment, was conducted by the investigator prior to onset of management. An explanation of the Bliss symbol communication system and subsequent questions and/or concerns about the program were answered for both the patient and/or family member. An oral-peripheral examination of the speech mechanism, an informal evaluation of oral and verbal apraxia, a pure-tone hearing screening evaluation, with a Beltone audiometer (Model 10-C), the Token Test, and the Functional Communication Profile were administered at this time.

Pre- and post-management interviews were conducted with the spouse of each apraxic-aphasic in the study in order to assess functional use of the Bliss symbol system in the immediate living environment and such qualitative changes in non-speech-language behaviors as may have occurred (see Appendix F for sample of interview questionnaire). The interview was conducted at the time of the initial diagnostic evaluation and, then again after completion of the training program. The questionnaire was a devised checklist of specific behaviors which follow the model provided by Darley (1972). The behaviors assessed included qualitative changes observed in mood, attitude, willingness to interact with other individuals in their environment,

degree of dependency/independency, level of aspiration and overall aspects of patient's psychological status, including adaptation to his problem and environment. Following or concurrent with acquisition of the Bliss symbols and their subsequent utilization as a functional means of communication, it was anticipated that qualitative changes in non-speech-language behaviors might occur.

Rationale for Utilizing the Bliss Symbol System

The choice of Bliss symbols over other nonvocal systems, such as Amerind, SEE, ASL, is because Blissymbolics is not a "closed" system as are these other signing/gesturing systems. By "closed" system is meant that if a person is not familiar with the signs or gestures, the ability to comprehend what is being designated is impossible and the user's potential for fulfilling his communication needs is substantially decreased. "Closed" systems do not usually exhibit response modes with universal comprehension capabilities. With Blissymbolics, no prior knowledge is required because the English word is written directly underneath it, so anyone who can read can communicate with the subject (Harris-Vanderheiden, 1976). The other obvious reason for preferring Blissymbolics to a signing/gesturing system of communication is the aphasic's inability (due to right-sided hemiplegia)

to manipulate both hands and arms to the degree required for such manual systems.

The advantage of Bliss symbols over other pictographic systems, such as Rebuses, is that the former has greater "generalizability potential" for the user (Harris-Vanderheiden, 1976). Each symbol represents a concept or idea, rather than a single word unit. As McNaughton (1976) indicates, an individual symbol--whether by itself or a combination of several symbols, describes a concept which can have a wide range of meanings, "e.g., the symbol for 'building,' depending on the combination of symbols or the situational context, can be interpreted as house, home, structure, hotel, garage, shack, palace, office, tent, etc" (p. 170). Consequently, utilization of 100 symbols can generate an essentially unlimited number of words, with the possibility of symbol development a direct function of the individual's "creative" abilities (McNaughton, 1976).

In response to why Bliss symbols might be more appropriate with the nonvocal adult aphasic as opposed to utilizing traditional orthographic symbols, the investigator cites three major reasons:

1. Since one is dealing with individuals who have input (auditory-visual) problems, as well as output (verbal-graphic) problems,

comprehension of morphemes may be difficult.

According to McNaughton (1976):

Written words are composed of visual elements (letters and groups of letters) which are related to sound. Bliss symbols are composed of visual elements which are related to meaning--sometimes directly through pictorial representation; sometimes indirectly through representing an idea related to the meaning; sometimes arbitrarily (p. 168).

The available cues that signal a morpheme or abstract visual configuration are based on "sound shape" relationships (McNaughton, 1976).

The ability to process these cues may be impaired in the adult aphasic patient. Most Bliss symbols, however, consist of pictographic representations which facilitate comprehension because the shape itself is characteristic of what the symbol means.

2. Since the aphasic subjects will present essentially limited or no functional verbal communication skills at the onset of the program, the necessity for an alternative/augmentative communication system is apparent. When recommending implementation of a supplemental communication system, two concerns should be considered. First the alternative/augmentative communication system should be able to be learned and implemented as quickly

as possible. Secondly, it should provide the individual with an immediate functional method of communication. The Bliss symbol system would appear to serve both these functions.

Harris-Vanderheiden (1976) has given the following reasons for a decision to use Blissymbolics as an auxiliary means of communication for a group of severely retarded children:

. . . the children were nonvocal and really needed a means of communication which would be functional for them immediately . . . they were becoming very frustrated . . . it was important to provide them with a means of communication before they began to cope with their frustration by giving up attempts to communicate (p. 122).

3. Because of the Bliss symbols "generalizability" advantage, having 100 symbols as opposed to 100 words, will greatly increase the vocabulary expansion possibilities of the individual. Depending on the position, the size (large or small), and/or how the symbols are placed in combination, they are capable of offering an infinite number of meanings. As McNaughton (1976) states, "inherent in the Bliss symbol system is a

complex, comprehensive, creative communication potential" (p. 172).

Bliss symbols appear easy to learn due to the many cues to the meaning of the symbol that are available visually. Consequently, the symbols may provide the nonvocal individual with a means of communication that is functional in a very short period of time.

MANAGEMENT MATERIALS AND PROCEDURES

The language stimulation management program was initiated following the initial diagnostic interview and pre-testing procedures. Each session was 50 minutes in duration and each subject had two to three 50 minute sessions per week. This provided a total of 20 hours training time in learning the Bliss symbols.

Stimulus Materials and Presentation

All Bliss symbols initially were presented on 3" x 5" cards. After the subject acquired successfully 30 Bliss symbols, the 100 word vocabulary was utilized (see Appendix G). If the subject progressed through the 100 word vocabulary, additional vocabulary displays (200 and 400 word) available through the Blissymbolics Communication Foundation, were presented (see Appendix H for 200 word vocabulary display; Appendix I for 400 word vocabulary display).

Each symbol was presented with a corresponding

picture stimulus to visually associate the Bliss symbol with the appropriate meaning. Due to the visual field deficit exhibited by all four subjects (specifically, a right homonymous hemianopsia as determined from medical histories), the presentation of all materials was within each of the patient's visual field.

Type and Schedule of Reinforcement

Generally, reward for correct performance was social, i.e. the trainer smiled, expressed pleasure, said "very good" or "that's right." Because motivation is frequently a problem in the brain-damaged person (Glass, Gassaniga, and Premack, 1972), the reinforcement aspect of aphasic language training becomes crucial to success of the program. All attempts were made to maintain the highest possible motivational level for all subjects throughout the entire length of the management program. Reinforcement was administered for each correct response. Complexity of responses increased as each subject progressed through the management program.

Data Collection

The subjects' responses were recorded by the trainer on printed record sheets. Subject identification information was placed on all data sheets. Three different types of record sheets were used (see Appendix J).

A "response record sheet" served as a data collection form for each stimulus item of a specified task. Ten correct responses for each stimulus item were required.

LaPointe's (1977) "Base 10 Response Form" was used as a session-by-session analysis of a patient's performance on individual tasks. The 10 stimulus items on the Response Form were scored daily over the period of 10 management sessions. Listing of the task presented, e.g., matching symbol to picture, desired criterion levels, and spaces for a score on each item during every session, were elements of the Base-10 Response Form (LaPointe, 1977). A different response form was used for each presented task so that progress on each task could be plotted. Plus or minus scoring was utilized to score overall daily performance for each Bliss symbol. Ninety percent correct responses or more for three consecutive sessions was necessary for a symbol to be regarded as learned. The only variation in this rule was that 90 percent success on symbols during the first two sessions constituted successful learning. Management procedures for error items, e.g., supplemental visual and/or auditory cueing by investigator, was specified and recorded on the Base-10 Response Form under

the section labeled "post-baseline therapy" (LaPointe, 1977). Baseline measurement on all patients was not done because none of the subjects had been exposed to the Bliss symbol communication system prior to initiation of the management program.

A "verbal response record" sheet developed by the investigator was used to assess each subject's verbal expressive skills on a daily basis. Differentiation was made between intelligible vocalizations made while pointing, and intelligible vocalizations made without a pointing response. Baseline measurements for the most part produced 0% accuracy since subject selection criteria required subjects to have essentially no functional speech skills.

At the end of each session, the total number of Bliss symbols being used correctly by the subject was recorded. In addition, a daily session-by-session analysis was made of how the Bliss symbols were being utilized, i.e., number of symbols used to generate a syntactically and semantically correct linguistic response. Daily, weekly, and cumulative tabulations of the number of Bliss symbols acquired were plotted graphically.

Stimulus Prompts

The trainer provided visual and verbal prompts to

evoke a response from subjects. They were presented not only to initiate a response, or series of responses from the subject, but to gain and maintain the subject's attention. Visual prompts consisted of pointing to the stimulus items--picture stimulus and/or Bliss symbol. Verbal prompts consisted of the trainer saying, "Mr. _____, what goes with this picture?", or "Look at all the symbols." In either case, the trainer did not provide the subject with information relative to the correct choice.

Response Topography

A simple motor response involving pointing to an appropriate Bliss symbol or picture stimulus was required throughout the entire program. Prior to introduction of the 100 word vocabulary display, the client was requested to manipulate the 3" x 5" cards containing the Bliss symbols in appropriate syntactical order when formulating a sentence with the symbols. When the subject had some writing skills, the request was made to write the symbols on paper.

While no vocal responses were required from the subjects, vocalizations were encouraged. The reason for encouraging all speech attempts was that the Bliss symbols were designed to function as an augmentation as well as an alternative to the subject's present communication skills. When pointing to the symbol or

series of symbols, the investigator vocalized meaning and encouraged the subject to co-vocalize along with pointing. If the subject was required to use several Bliss symbols to complete a specific response chain, the responses were in the following manner:

1. Responses proceeded left to right when positioning the stimulus cards.
2. Responses maintained grammatical structure, e.g., in a declarative sentence, adjective-subject-verb-preposition-adjective-direct object.

Self-Practice Materials

In order to provide additional experience utilizing Bliss symbols, each subject was instructed to practice writing each new Bliss symbol a minimum of 10 times. All homework assignments were to be given to the investigator at the following session. In addition to the required written assignment, each subject was encouraged to utilize the symbols to communicate with a family member and/or an individual in their immediate living environment for a minimum of one hour.

MANAGEMENT PROGRAM

The management program followed the recommended Teaching Guidelines set forth by McNaughton (OCCC, 1974). The outline of the program is as follows:

Symbol Acquisition

1. Instruction of the basic 30-word symbol vocabulary.
2. Introduction of the 100-word symbol vocabulary.

General Management Guidelines

Symbol Acquisition

In order to provide consistency in teaching new Bliss symbols, a three-step procedure was incorporated for each new symbol presented (OCCC, 1974). The procedure consists of the following: (a) introduction of new symbols, (b) using symbols purposefully, and (c) review of symbols. Management goals for these three parameters of symbol acquisition are presented in Appendix K, Section I. These goals were abstracted from the OCCC's (1974) Teaching Guidelines and were modified to some extent for their utilization with the adult aphasic subjects in this investigation.

1. Instruction of the basic 30-word symbol vocabulary.

The initial 30 symbols introduced were selected on the basis of usefulness to the subject and individual interests. Management was individualistic in this sense because it was geared to the subject's immediate specific needs. Since all subjects exhibited essentially no functional speech skills, the introductory set of Bliss symbols used for each was very similar.

2. Introduction of the 100-word symbol vocabulary.

After successfully demonstrating the ability to use 30 symbols, the 100-word vocabulary display was introduced. If the subject demonstrated difficulty in utilizing the vocabulary display, additional practice combining the individual Bliss symbol cards to form a response was required. Although the investigator did not expect to go beyond the 100-word vocabulary display in 20 hours of management, the 200-word and 400-word vocabulary displays were available in case a subject successfully completed symbol acquisition of the 100-word display.

Procedures for instruction of the basic 30-word symbol vocabulary and introduction of the 100-symbol display are presented in Appendix K, Section II.

General Management Guidelines

In addition to following the teaching guidelines for symbol acquisition, specific and uniform teaching methods were followed by the investigator. For example, any time a symbol was pointed to by the subject--whether on an index card or on a vocabulary display, the investigator said the name of the symbol. Also, every time the investigator pointed to or wrote a Bliss symbol, the word was spoken.

Additional principles in Bliss symbol instruction are presented in Appendix K, Section III. All of these

guidelines were utilized throughout the entire program. It is felt that this procedure would provide an optimum framework for acquisition of the Bliss symbols, and a uniform method of presentation of the system.

DATA REDUCTION AND ANALYSES

A descriptive analysis was performed on number of Bliss symbols acquired (daily, weekly, and cumulative), and number of Bliss symbols used to generate a syntactically and semantically correct response, throughout the 20 hours of management. These nominal data were displayed tabularly and graphically.

Changes in speech-language behaviors as reflected by pre- and post-management scores for each of the PICA subtests, and the Overall score, were evaluated statistically using a one-factor analysis of variance for repeated measures procedure. An alpha level of .05 was accepted as the minimum acceptable level for all statistical tests.

The pre- and post-management FCP overall scores were compared statistically utilizing the Wilcoxon matched-pairs signed-rank test (Wilcoxon signed-ranks test).

Pre- and post-management interviews with the same individual in the aphasic's immediate living environment were conducted in order to evaluate qualitative changes in non-speech-language behaviors as

well as provide further information relative to their impression of the acquisition and use of the Bliss symbol communication system.

RESULTS AND DISCUSSION

RESULTS

Individual Results

In the following report of results for each subject, there will be presented a table providing response data over the 20 one-hour management sessions. This will include the daily Bliss symbol acquisition, cumulative Bliss symbol acquisition, number of symbols to generate a response, and number of intelligible responses. To aid in interpretation, these data are also represented graphically for each subject. Finally, there will be provided information obtained from the pre- and post-investigation interviews.

Subject BW

Subject Description

BW was a 65-year-old male, five months beyond his CVA (left hemisphere). He evidenced right-sided hemiplegia which required use of a three-pronged cane for ambulation. Oral-peripheral speech examination results revealed right-sided facial paresis; severe oral, verbal, and lingual apraxia; and no evidence of

drooling. A right homonymous hemianopsia was present. No other visual problems were noted; however, glasses were used only for reading. Pure-tone hearing screening revealed hearing within normal limits for his age. BW resided at home with his wife.

BW's conversational speech generally consisted of unintelligible verbal responses comprised of a variety of phoneme combinations rather than a series of repetitive monosyllables. For the most part, imitation of monosyllabic words elicited intelligible but distorted responses. Speech imitation of polysyllabic words produced mostly unintelligible responses. Intelligible vocalizations, although slightly distorted, occurred during recitation of numbers, letters of the alphabet, his name, and spontaneous one word verbalizations. Generally, BW would nod his head along with appropriate melodic intonation--particularly yes/no responses, use some additional type of gestural response, and/or attempt to vocalize when communicating with his family. A mild receptive language impairment was indicated by results of the Token Test. Reading skills were present (PICA Gestural subtest V and VII and FCP reading scores). Graphic skills (copying tasks and dictation) were good, although most written productions were somewhat distorted. The subject evidenced ability to write intelligibly his name, numbers (1-10), letters of the alphabet, and some family member names without verbal or written cues.

Spontaneous writing from memory for monosyllabic and polysyllabic words was poor, producing unintelligible written responses.

Management Results

Number of Symbols Acquired:

BW acquired a cumulative total of 182 Bliss symbols after completion of 20 one-hour management sessions (Table 1, Figure 1). Daily Bliss symbol acquisition ranged from 5-16, with an average daily acquisition rate of nine symbols. Initial acquisition in the first week was slow, learning only five to seven symbols at each session. From the second through the fifth weeks, symbol acquisition increased from 5 to 13, with Session 12 presenting the maximum number of symbols (16) acquired at any one session. An increasing growth pattern for daily symbol acquisition was observed during Sessions 13 through 20, with a less dramatic rate of change evidenced.

Each Bliss symbol with its corresponding meaning was reproduced by the investigator on a 3x5 plain index card for the subject's use at home. All index cards were held together by three rings, with a card added for each newly learned symbol. This procedure allowed fairly easy access to each Bliss symbol, simply by flipping over each card. After the first 30 symbols were learned (Session 5), the 100-word vocabulary display

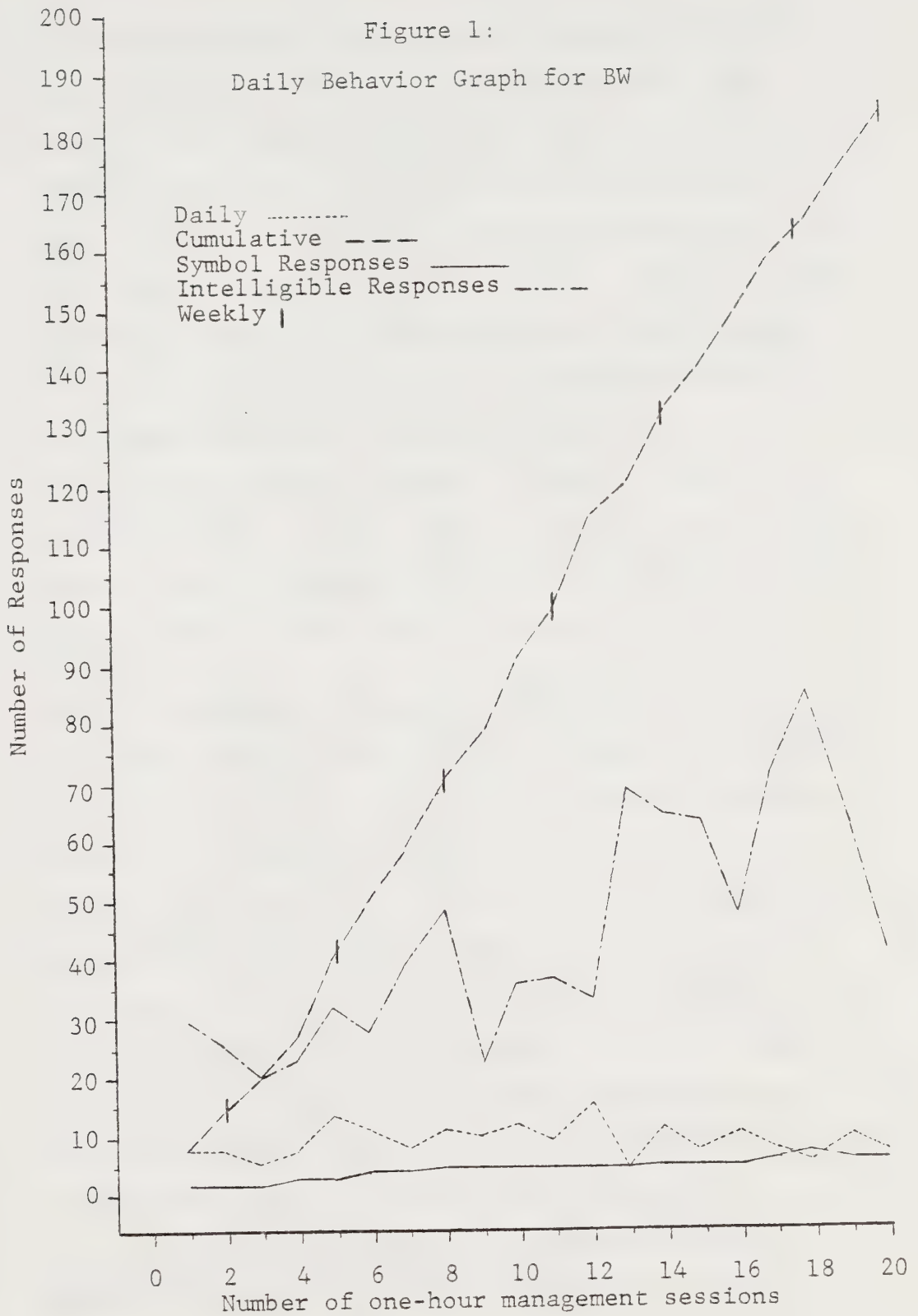
Table 1. Daily response data over 20 one-hour management sessions for subject BW

Management Session	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Daily Bliss Symbol Acquisition	7	7	5	7	13	10	8	11	10	12	9	16	5	12	7	11	7	6	11	8
Cumulative Bliss Symbol Acquisition	7	14	19	26	39	49	57	68	78	90	99	115	120	132	139	150	157	163	174	182
Number of Symbols to Generate a Response	1	1	1	2	2	3	3	4	4	4	4	4	4	5	5	5	6	7	6	6
Number of Intelligible Responses	29	25	19	23	31	27	39	43	22	35	36	32	67	64	63	48	71	85	62	41

Table 2. Daily response data over 20 one-hour management sessions for subject HM

Management Session	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Daily Bliss Symbol Acquisition	6	8	4	4	14	9	5	5	6	6	6	4	5	10	6	9	5	8	7	11
Cumulative Bliss Symbol Acquisition	6	14	18	22	36	45	50	55	61	67	73	78	83	93	99	108	113	121	128	139
Number of Symbols to Generate a Response	1	1	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4
Number of Intelligible Responses	2	2	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	2

Figure 1:
Daily Behavior Graph for BW



was introduced into the management program. At this point, the subject began to use the 100-word symbol display in the home setting rather than the set of marked index cards. Due to BW's rapid acquisition of Bliss symbols, the 200-word vocabulary display was introduced into management during Session 15. Figure 1 shows the daily, weekly, and cumulative Bliss symbol acquisition for BW over the 20 one-hour management sessions. As represented by the cumulative gains reported in Table 1, and graphically shown in Figure 1, there was a uniform increase in Bliss symbol acquisition at a fairly constant rate of change over the 20 management sessions. This yielded a linear pattern of change.

Number of Symbols to Generate a Response:

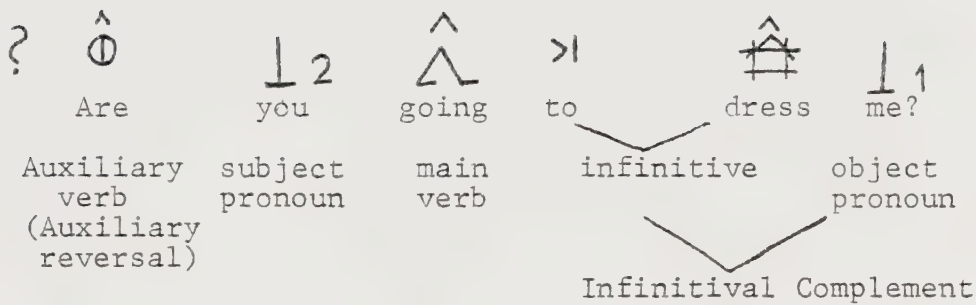
The number of Bliss symbols to generate a response, both syntactically and semantically correct, increased over the 20 management sessions (see Table 1). For example, during the first three sessions, an individual Bliss symbol indicating a single word, i.e., nouns or vocabulary items (such as yes/no and hello/goodbye), was used to respond. In Session 4 and 5 two Bliss symbols were used to respond. The two-word combinations were "MAIN VERB-DIRECT OBJECT" and "SUBJECT PRONOUN-MAIN VERB." In Sessions 6 and 7, a three-symbol response was used, for the syntactic structure of "SUBJECT OR SUBJECT PRONOUN-MAIN VERB-DIRECT OBJECT OR OBJECT PRONOUN."

During Sessions 8 through 13, four Bliss symbols were used to formulate a response which incorporated the previous syntactic structures and introduced adverbs, personal pronouns, adjectives, wh-pronouns, and/or auxiliary verbs into the response. A five-symbol response across the next three sessions resulted in adding the syntactic categories of preposition, object of the preposition, obligatory do, and the infinitive.

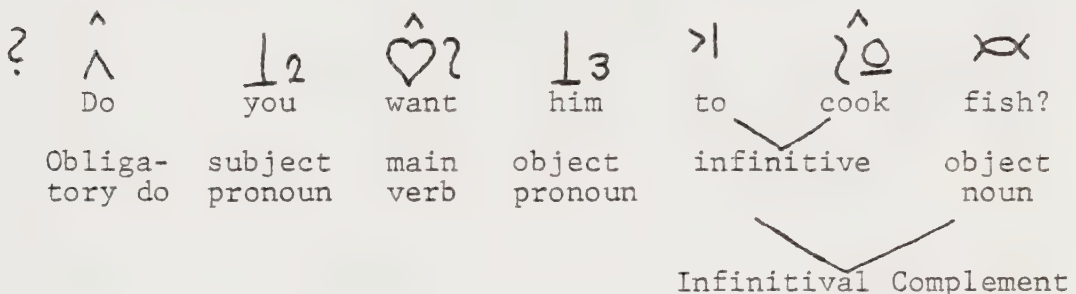
For example:

?					
	Do	you	want	hot	food?
	Obligatory do	subject pronoun	main verb	adjective	direct object
?					
	When	do	I	need	medicine?
wh-pronoun	obligatory do	subject pronoun	main verb	direct object	

In Session 17, 19, and 20, six Bliss symbols were used to generate a response with five word combinations indicated. Consider the following example of five syntactic categories requiring six Bliss symbols to construct the response:



In Session 18, seven Bliss symbols (the maximum number used by any of the four subjects) were used with six word combinations evidenced. An example of the syntactic categories presented in a seven Bliss symbol response was:



From the 17th Session on, BW consistently used syntactically and semantically correct responses, using a minimum of six Bliss symbols. In so doing, a wide variety of Bliss symbols and linguistic structures were evident.

Number of Intelligible Responses:

In Table 1 and Figure 1, a session-by-session report of the number of intelligible responses produced by BW while simultaneously pointing to a Bliss symbol or series of symbols is displayed. Over 20 sessions, BW's intelligible responses totalled 862, ranging from

19 to 85 daily, with an average of 43.1 intelligible responses per session. At the onset of management, the subject had to be reminded every time he responded to try to vocalize along with pointing to the symbol. By Session 10, however, almost no encouragement from the investigator was necessary. In the last two weeks of management, there were several instances when BW emitted a 4-5 word intelligible response while pointing to the series of corresponding Bliss symbols. Intelligible vocalizations appeared to evoke surprise and disbelief in the subject at this accomplishment. It was observed by the investigator that BW's vocalizations were consistently more spontaneous, more relaxed, and more frequently intelligible in the last five sessions.

Investigation Interview

The pre- and post-management interviews were conducted with BW's wife in their home. According to the informant, BW was generally in good spirits, seldom bored or depressed, but occasionally experienced frustration and anger when unable to dress himself or be understood when trying to communicate. Prior to Bliss symbol instruction, the subject would express his feelings or communicate his needs through the use of gestures, yes/no responses, and attempts to vocalize. Since most of the subject's conversational speech was unintelligible, BW would give up easily and/or get what

he wanted himself when listener comprehension became impossible. Although most of the time BW was tolerant when communicating with family members, occasionally he would experience embarrassment and tension when trying to communicate with friends or strangers. It was reported that most of the time, BW channelled his energies toward recovery and evidenced a moderate degree of motivation and desire to be independent. The informant also felt that for the most part BW dealt with his problems realistically and had reached an acceptance of his disability.

In the post-management interview, several observed changes were described by the informant. In addition to gestures, yes/no responses, and unintelligible vocalizations, BW began to incorporate Bliss symbols into his attempts at communication. Initially, the symbols were used as a last resort when the gestures and other methods failed to produce listener comprehension. The informant stated that BW began to realize the need for an alternative/augmentative system to supplement his existing but deficient communication skills. After implementation of the 100-word vocabulary display, it was reported that BW began to use the symbols to a greater degree, putting a series of symbols together to form a response. As the subject progressed in symbol acquisition, it was observed that his vocalizations increased in intelligibility. According to the

informant, as BW pointed to the Bliss symbols to make a sentence or ask a question, "Many of the words were said correctly." BW appeared to enjoy expressing himself with the symbols to family members; however, he did not use the symbols with friends or strangers. Less tension and an increased tolerance for communication was reported. According to the informant, BW also evidenced more motivation, more independence and a greater channelling of his energies toward recovery. Much of his free time was spent reviewing the Bliss symbols and constructing sentences on the 100-word display. After the 20 hours of Bliss symbol instruction, it was reported that BW was more interested in his recovery, experienced less frustration and enjoyed communication more. The informant summarized her feelings regarding the utility of the Bliss symbol communication system in this way: "I think the symbols are very helpful. Now when BW tries to tell me something, he uses the symbol display. I can understand what he's trying to say right away. I don't have to guess anymore."

Subject HM

Subject Description

HM was a 59-year-old male, four months beyond his CVA (left hemisphere). He evidenced a right-sided

hemiplegia which required use of a cane for ambulation. Oral-peripheral speech examination results revealed right facial paresis; severe oral, verbal, and lingual apraxia; and no evidence of drooling. A right homonymous hemianopsia was present. No other visual problems were noted with the exception of glasses which the subject had worn since he was 36 years old. Pure-tone hearing screening revealed hearing within normal limits for his age. HM resided at home with his wife.

HM's conversational speech consisted of unintelligible verbal responses characterized by the same repetitive monosyllabic response, i.e., "no-no-no." This same repeated phoneme combination was for the most part undifferentiated from the subject's other "minimal" verbal responses and occurred consistently in isolated word production (monosyllabic), spontaneous production of name, numbers (1-10), letters of the alphabet, or speech imitation tasks. Generally, HM would communicate through the use of gestures (hands, facial), or attempt a written production of what he was trying to convey. A moderate receptive language impairment was indicated by results of the Token Test. Some reading skills were present (PICA Gestural subtest V and VII and FCP reading scores). Graphic skills for copying words were fair, largely characterized by inaccurate but intelligible attempts at the correct production, i.e., spelling errors, in-class errors, assorted words or

letters, and/or letter reversals. Copying geometric forms of varying complexity produced for the most part accurate production but lacked "symmetry," e.g., not in the right spatial relationship or incomplete closure. HM was able to produce spontaneously from memory intelligible productions of his name, address, numbers (1-10), a portion of the alphabet, and some family members' names. Due to HM's impaired ability in conceptualizing the graphic form of the word or letters, spontaneous writing from memory for monosyllabic and polysyllabic words and, to a lesser degree, writing from dictation, produced unintelligible written responses.

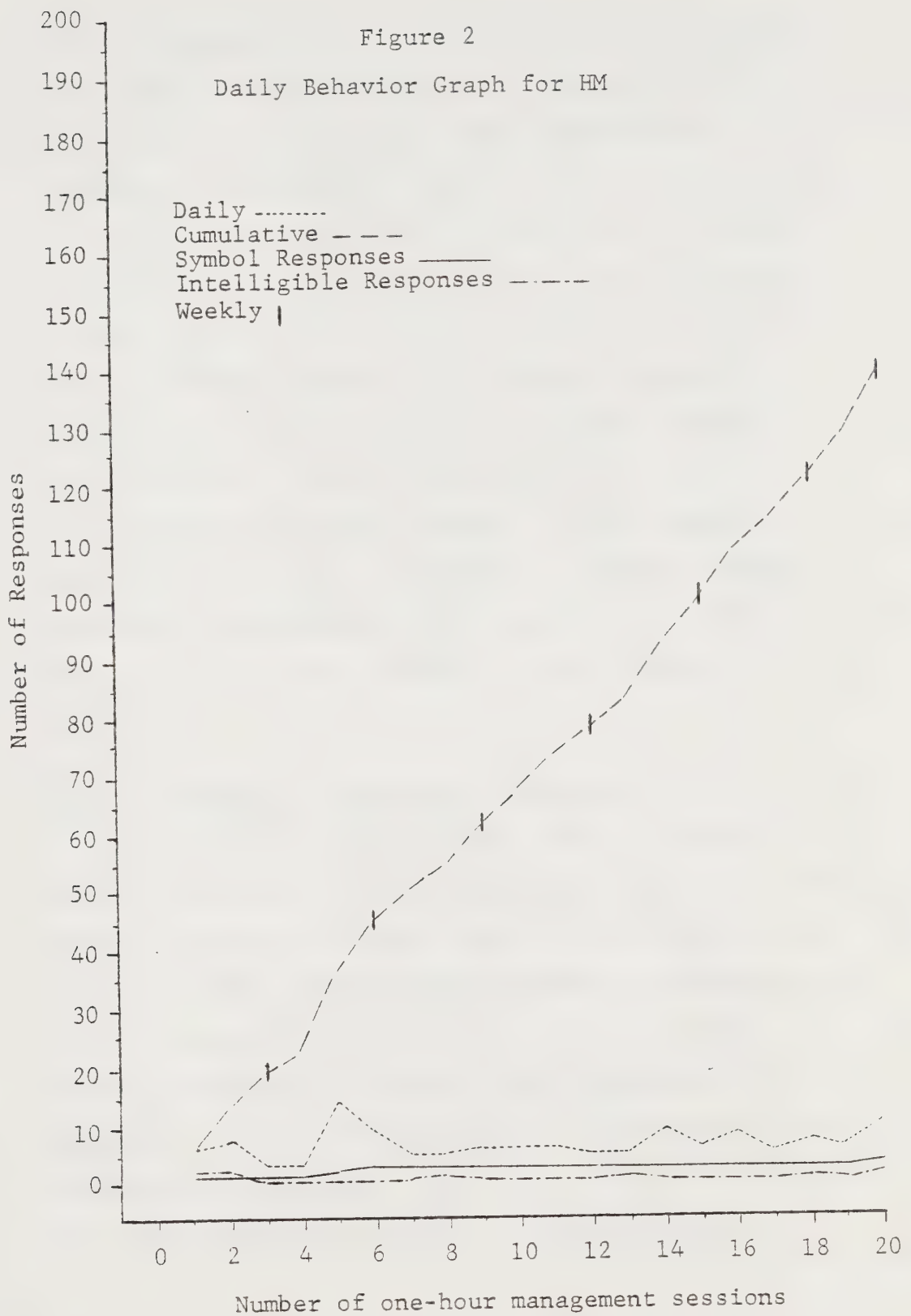
Management Results

Number of Symbols Acquired:

HM acquired a cumulative total of 139 Bliss symbols after completion of 20 one-hour management sessions (Table 2, p. 60, Figure 2). Daily Bliss symbol acquisition ranged from 4-14, with an average daily acquisition rate of approximately six symbols. As presented in Table 2, and shown in Figure 2, acquisition on a session-by-session basis was more uniformly consistent, with only three sessions resulting in acquisition of more than 10 symbols. Also seen in Figure 2 are the weekly and cumulative Bliss symbol totals over the 20 hour instruction period.

Figure 2

Daily Behavior Graph for HM



To enhance daily acquisition of newly learned Bliss symbols and to allow a more convenient method of practice, a three-ringed index card collection displaying each Bliss symbol and its corresponding meaning was provided for the subject's use at home. Because of its accessibility, HM not only used this collection of Bliss symbol cards at home, but carried it with him outside the home setting. The 100-word vocabulary display was introduced into the management program during Session 9. The 200-word vocabulary display was not introduced into HM's program. As the cumulative acquisition indicates, the number of symbols acquired over the 20 sessions gradually increased at a fairly constant growth rate, yielding a linear pattern of change.

Number of Symbols to Generate a Response:

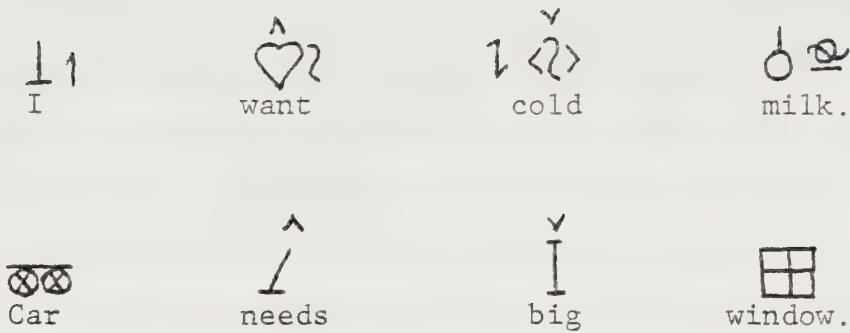
The number of Bliss symbols used to generate a response, that was both syntactically correct and semantically relevant, increased over the 20 sessions (see Table 2). For example, during the first three sessions, a Bliss symbol for a single word, i.e., noun, verb, personal pronoun or vocabulary item, was used in the response. In Session 4, two Bliss symbols were used in responses. The two-word combinations were in the form of "MAIN VERB-DIRECT OBJECT" and "PERSONAL PRONOUN-

MAIN VERB." During Sessions 5 through 19, three Bliss symbols were used to formulate a response, with the following variations in syntactic structure:

$\perp 1$ I	$\hat{\heartsuit} ?$ want	$\underline{\circ}$ food.
subject pronoun	main verb	direct object
$\perp 2$ You	$\hat{\odot}$ are	$\hat{\circ}$ cooking.
subject pronoun	auxiliary verb	main verb
$? \perp$ Who	$\hat{\odot}$ is	$\hat{\rightarrow} 1$ coming?
wh-pronoun	auxiliary verb	main verb
$? \wedge$ How	$\hat{\odot}$ are	$\perp 2$ you?
wh-pronoun	auxiliary verb	object pronoun

It required a total of 15 sessions (Sessions 5 through 19) for HM to learn the sequence of "SUBJECT or SUBJECT PRONOUN-MAIN VERB-DIRECT OBJECT or OBJECT PRONOUN."

In the last management session, a four-word Bliss symbol response which encompassed the syntactic structure of "SUBJECT or SUBJECT PRONOUN-MAIN VERB-ADJECTIVE-DIRECT OBJECT or OBJECT PRONOUN" was used. For example:



In summary, at the end of 20 hours of Bliss symbol instruction, the subject consistently used syntactically and semantically correct responses, using four Bliss symbols. As with the previous subject, there was a variety in the symbols and linguistic structures employed.

Number of Intelligible Responses:

A session-by-session report of number of intelligible responses produced by HM while simultaneously pointing to a Bliss symbol or series of symbols, is given in Table 2, and shown in Figure 2. Across 20 sessions, HM emitted a total of nine intelligible verbal responses, ranging from 0 to 2 during any one session. The subject was asked to say the meaning of the symbol while pointing to it. Only unintelligible verbal responses primarily consisting of monosyllabic repetitive series, i.e., "no-no-no," accompanied the pointing response. The intelligible verbal responses noted were monosyllabic words. Throughout the training period, minimal

or no tension during attempted speech was observed when vocalization accompanied the pointing response. In contrast, frustration resulting in oral-facial tension was apparent when the subject attempted to vocalize without utilization of the Bliss symbol display. HM seemed aware that his verbalizations were unintelligible and that he was unable to communicate what he intended. When this occurred, HM began to point to the desired Bliss symbol response which usually resulted in successful completion of his communication attempt.

Investigation Interview

The pre- and post-investigation interviews were conducted with HM's wife in their home. According to the informant, HM was generally a happy and content person, occasionally experiencing frustration and anger when trying to "discuss something--especially how he wants work done around the farm," or when "others ignore him as if he wasn't there." Prior to Bliss symbol instruction, the subject expressed his feelings or attempted to communicate by using gestures (hands, facial expression), by taking people to what it was he wanted, or by trying to write. When other individuals tried to communicate with the subject, the wife indicated that HM "pointed to his mouth and arm and raised his hands in the air" in order to indicate his inability to speak. According to the informant, the

subject occasionally was ashamed or embarrassed about his "speech problem" but had a positive attitude toward himself and his physical problems. It was reported that HM gave up easily when attempting to communicate with family members and strangers. However, he would "try harder" when communicating with his wife, unless extremely tired. He experienced tension and little tolerance during communication attempts, resulting in an avoidance of situations in which he would need to respond. It also was reported that the subject channelled energy into his recovery, displaying an interest and motivation in trying to improve both his physical and communication skills. The subject's desire to be independent always remained strong, regardless of occasional periods when he dwelled on his disability. For the most part, the informant felt that HM dealt with his physical problems realistically and had reached an acceptance of the resulting restrictions placed on him; however, the informant felt that HM did not always deal with his speech problems in a realistic manner and experienced difficulty in coping with his inability to communicate. Prior to management, the informant stated that HM had not yet reached an acceptance of his verbal communication skills.

In the post-management interview, several

observed changes were described by the informant. When attempting to communicate, the subject always used his habitual method of gesturing as the initial step in the communication process. Rather than giving up after the first few communication attempts, however, HM began to use the Bliss symbols as a supplement to his gestural response in order to express himself. The informant reported that the subject began to use the symbols to a greater degree after introduction of the 100-word vocabulary display. It was reported that initially, HM was embarrassed to use the index card collection of Bliss symbols with family members. As the number of newly learned Bliss symbols increased, as proficiency in incorporating those symbols into an accurate linguistic structure developed, and as implementation of the 100-word vocabulary was made possible, the subject became more comfortable in using the symbols with family members. By the end of management, however, he still did not use the symbols with individuals outside the family. It was reported that HM enjoyed working with the Bliss symbols, particularly the 100-word vocabulary display. As the sessions progressed and his knowledge of the symbol system increased, enjoyment of Bliss symbol usage appeared to increase simultaneously. Less tension and frustration along with more tolerance during communication attempts was

reported. According to the informant, this was due to a higher incidence in the number of times communication was successfully accomplished through Bliss symbol usage. HM's high degree of motivation and independence remained at the same level. In an attempt to realistically deal with his extreme difficulty in formulating speech sounds, HM began to accept the ramifications of his speech disability by acknowledging the need for an alternative/augmentative communication system. After 20 hours of Bliss symbol management, it was reported that HM appeared to recognize the value of this alternative/augmentative communication system and this was demonstrated by his increasing usage, and enjoyment, of the system in the home environment.

It is of interest to note that there is an apparent difference reported between overall morale and behavior in specific situations.

Subject MH

Subject Description

MH was a 68-year-old male with a history of several CVA's (all left-hemisphere), the last CVA occurring more than three years prior to the onset of this management program. MH evidenced right-sided hemiplegia along with a repaired fracture of his right

hip which required total confinement to a wheelchair. Oral-peripheral speech examination results revealed right facial paresis; severe oral, verbal and lingual apraxia; dysarthria; and moderate drooling. A right homonymous hemianopsia was present. No other visual problems were noted with the exception of glasses which the subject had worn most of his life. Pure-tone hearing screening revealed hearing within normal limits for his age. A moderate degree of emotional lability was observed. MH resided at a nursing home in the Wichita area with regular visitation from his wife.

MH's conversational speech consisted of unintelligible verbal responses comprised of some variation in phoneme production. At times, the verbal responses consisted of a series of repetitive monosyllables and could not be differentiated from the subject's other minimal responses. Unintelligible verbal responses with some phoneme variation also characterized the subject's attempts at reciting his name, numbers (1-10), monosyllabic words and speech imitation tasks. Spontaneous speech attempts produced greater phoneme variation than requested speech tasks. Generally, MH communicated his needs through gestures accompanied by unintelligible vocalizations, with an approximation of the desired response sometimes occurring. A

moderate receptive language impairment was indicated by results of the Token Test. Minimal reading skills were present (PICA Gestural subtest V and VII and FCP reading scores). Graphic skills were poor, primarily consisting of unintelligible responses for spontaneous written productions, writing from dictation, or copying tasks (numbers, letters, words). Graphic responses, although unintelligible, exhibited some variation in production and could be differentiated from other minimal graphic responses. Copying tasks of geometric forms of varying complexity produced graphic responses that were not completely accurate but evidenced an approximation of the correct form.

Management Results

Number of Symbols Acquired:

MH acquired a cumulative total of 115 Bliss symbols after completion of 20 one-hour management sessions (Table 3, Figure 3). Daily Bliss symbol acquisition ranged from 0-11, with an average daily acquisition rate of approximately six symbols, excluding data from Sessions 8 and 13, where no new symbol acquisition was observed. In Session 8, the subject was ill and during Session 13, the subject's wife was hospitalized for cardiac problems. With the exception of data from these two sessions, a relatively consistent symbol learning rate over 20 sessions was observed (see Figure 3). Also seen in Figure 3, are

Table 3. Daily response data over 20 one-hour management sessions for subject MH

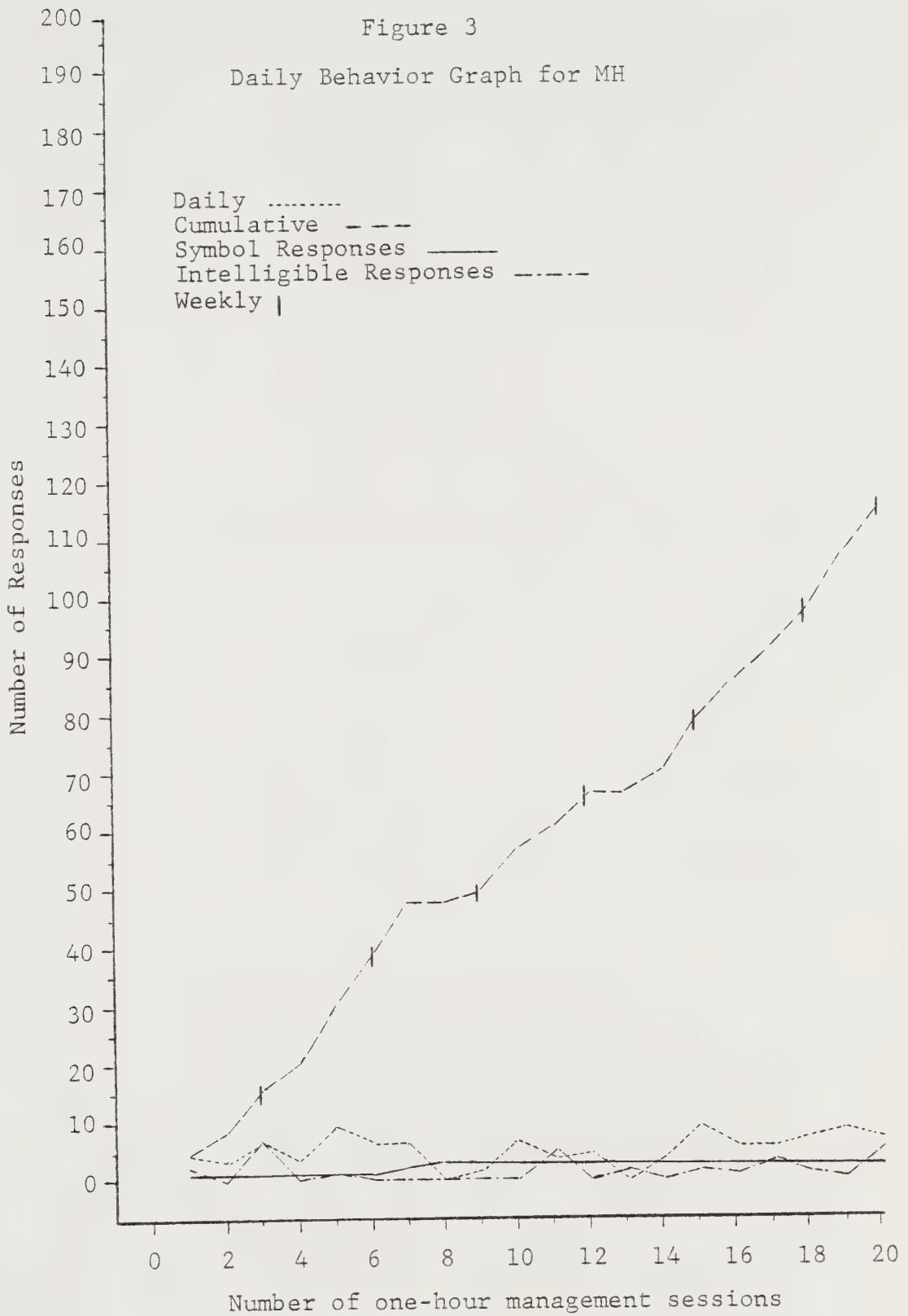
Management Session	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Daily Bliss Symbol Acquisition	5	4	7	4	11	8	8	0	2	8	4	5	0	4	9	6	6	7	9	8
Cumulative Bliss Symbol Acquisition	5	9	16	20	31	39	47	47	49	57	61	66	66	70	79	85	91	98	107	115
Number of Symbols to Generate a Response	1	1	1	1	1	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Number of Intelligible Responses	2	0	7	0	1	0	0	0	0	0	5	0	2	0	2	1	4	1	0	6

Table 4. Daily response data over 20 one-hour management sessions for subject EB

Management Session	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Daily Bliss Symbol Acquisition	2	3	2	0	0	6	9	4	6	6	3	7	4	5	10	0	7	5	2	8
Cumulative Bliss Symbol Acquisition	2	5	7	7	7	13	22	26	32	38	41	48	52	57	67	67	74	79	81	89
Number of Symbols to Generate a Response	1	1	1	1	1	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3
Number of Intelligible Responses	7	23	9	16	6	13	4	8	3	3	3	5	2	4	3	4	5	9	8	6

Figure 3

Daily Behavior Graph for MH



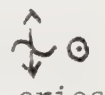
the weekly and cumulative Bliss symbol totals over the management period. As the cumulative data suggests, number of Bliss symbols acquired over the 20 hour training period increased at a fairly constant rate of change, with the exception of those two sessions where no new symbols were learned. As a result, the total number of Bliss symbols acquired only approximated a linear pattern of change.

To enhance daily acquisition and utilization of newly acquired symbols, and to provide a more facilitating method of practice, a three ringed index card collection displaying each Bliss symbol with its corresponding meaning was given to MH for use in the nursing home. The 100-word vocabulary display was introduced into the program in Session 9. Due to the subject's observed difficulty in locating the desired symbols on the 100-word display, the index card collection of Bliss symbols was used almost exclusively by MH.

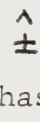
Number of Symbols to Generate a Response:

The number of Bliss symbols to generate a syntactically correct and semantically relevant response increased over the 20 hour instruction period, with a plateau developed at a three symbol response (see Table 3). During the first six sessions, an individual Bliss symbol representing a single word (in the form

of nouns, verbs, personal pronouns or vocabulary items) was used in responding. In Session 7, the subject implemented two symbols to generate a response using the syntactic structure of "SUBJECT or SUBJECTIVE PRONOUN-MAIN VERB" and "MAIN VERB-DIRECT OBJECT or OBJECTIVE PRONOUN." Bliss symbol representations for these syntactic combinations were reproduced on an individual index card and attached to the index card collection. For example:

			
I	know	brother	cries
subject pronoun	main verb	subject	main verb
			
need	toilet	like	you
main verb	object	main verb	object pronoun

During Sessions 8 through 20, three Bliss symbols were used to formulate a response (see Table 3, and Figure 3). Throughout these 13 sessions, the subject demonstrated an increasing proficiency in the use of the syntactic structure "SUBJECT or SUBJECT PRONOUN-MAIN VERB-DIRECT OBJECT or OBJECT PRONOUN." This proficiency, however, was evidenced with the index card collection and not with the 100-word vocabulary display. For example:

 I	 need	 medicine.
subject pronoun	main verb	direct object
 I	 like	 you.
subject pronoun	main verb	object pronoun
 Leg	 has	 pain.
subject	main verb	direct object
 Nurse	 wash	 me.
subject	main verb	object pronoun

At the end of 20 hours of management in the Bliss symbol communication system, MH consistently used syntactically and semantically correct responses, using a minimum of three Bliss symbols. In so doing, a variety of Bliss symbols and linguistic structures were evident. Usage of the symbols, however, was restricted to the index card collection of Bliss symbols.

Number of Intelligible Responses:

A session-by-session report of the number of intelligible responses produced by MH while

simultaneously pointing to a Bliss symbol or series of symbols is presented in Table 3, and shown in Figure 3. Over 20 sessions, MH emitted a total of 31 intelligible verbal responses, ranging from 0 to 7 daily, with an average of 1.6 intelligible responses per session. As the data indicate, only 10 intelligible responses were emitted in the first 10 sessions, while 21 of the total 31 intelligible responses occurred in the last 10 sessions. The subject was instructed to accompany each pointing response with the appropriate verbal response, and required minimal encouragement from the investigator after the initial session. The majority of vocalizations were unintelligible and sometimes varied in phoneme production. A moderate amount of drooling and some tension in the oral-facial area was observed when MH attempted to vocalize without pointing to the symbol. By comparison, when the subject pointed to the Bliss symbols, less drooling and less oro-facial tension occurred during verbalization. Vocalizations appeared more spontaneous, more relaxed, and more frequent during the latter five sessions.

Investigation Interview

The pre- and post-investigation interviews were conducted with MH's wife, who visited him regularly. The informant was aware of his interactions with the nursing home staff and his utilization of the Bliss

symbol system in his present environment. According to the informant, MH was generally in good spirits but became tearful and somewhat depressed when the informant was unable to visit. It was reported that he always smiled unless "someone he didn't like" approached him. MH always appeared to experience frustration and anger when he wanted something and could not communicate his needs. Although accepting of his dependency on people in his immediate environment, MH occasionally experienced anger when the staff did not respond to his needs. MH was described as enjoying being with people; however, he felt alone and without interpersonal stimulation most of the time. Generally, he occupied his time with "activities of daily living" and also enjoyed listening to religious tapes and music to help minimize the "boredom" he often felt. Prior to Bliss symbol management, MH expressed his feelings or attempted to communicate his needs through gestures coupled with unintelligible vocalizations. It appeared not to embarrass MH when trying to verbalize, but he experienced such oro-facial tension and frustration during these communication attempts that his tolerance for communicating with others was poor, he gave up easily and very often began to cry. If the nursing home staff did not comprehend what he was trying to say after several

attempts, he usually exhibited some form of emotionally labile behavior, e.g., excessive crying, laughing, anger or a temper tantrum. MH appeared to have minimal control of his emotions but as the informant reported, did not become physically violent during his emotional outbursts. Since MH suffered several strokes over a period of years, the informant felt the subject channelled little energy or motivation toward recovery or purposeful activity. The informant also reported that at times MH felt sorry for himself, dwelled on his disability and did not deal with his problems in a realistic manner. The informant also felt that he could cope with his problems most of the time and had accepted his disability with all its limitations.

In the post-management interview, numerous changes in MH's behavior patterns were reported by the informant. When he attempted communication with the nursing home staff, as well as with the informant, he used the index card collection of Bliss symbols to indicate his needs or feelings at that time. MH's habitual method of communication--gesturing--was bypassed, thereby utilizing the Bliss symbols not as a last resort, but as his first choice. It was reported that he appeared to enjoy expressing himself and "sought out" people with whom to show and demonstrate usage of the symbols. Because individuals in his immediate

living environment were better able to understand his needs, MH experienced less frustration and anger when communicating with others. It was reported that tension and emotionally labile behavior also decreased as the subject's ability to express his feelings and communicate his needs increased. According to the informant, MH began to channel his energies toward learning the Bliss symbols, carrying his index card collection of symbols with him at all times. It was observed that MH spent less time alone in his room and occupied most of his "free time" looking at the index card collection of Bliss symbols, sometimes enlisting the informant's or the staff's assistance for symbol practice. As MH acquired more symbols, became accustomed to the pointing response, and could integrate the symbols into an appropriate linguistic structure, the informant reported that his level of motivation for learning the symbols also increased. The informant also observed that, while the subject had generally accepted the limitations placed on him by his disability, MH appeared "recharged" and demonstrated a renewed interest for recovering a viable method of communication. According to the informant, MH felt this alternative/ augmentative communication was "necessary" and "useful" for him. The informant summarized her feelings

in this way: "It is so wonderful that he has been given something new to allow him to express himself . . . which doesn't build on previous education skills. Anything that can help him communicate is very worthwhile."

Subject EB

Subject Description

EB was a 60-year-old female with a history of several CVA's (all left hemisphere), the last CVA occurring over a year prior to this management. EB evidenced right-sided hemiplegia which required total confinement to a wheelchair. Oral-peripheral speech examination results revealed right facial paresis; severe oral, verbal, and lingual apraxia; dysarthria and a minimum amount of drooling. A right homonymous hemianopsia was present. No other visual problems were noted, with the exception of glasses which EB had worn since her first stroke more than 13 years ago. Pure-tone hearing screening revealed hearing within normal limits for her age. A minimal degree of emotional lability was observed. EB resided at home with her husband.

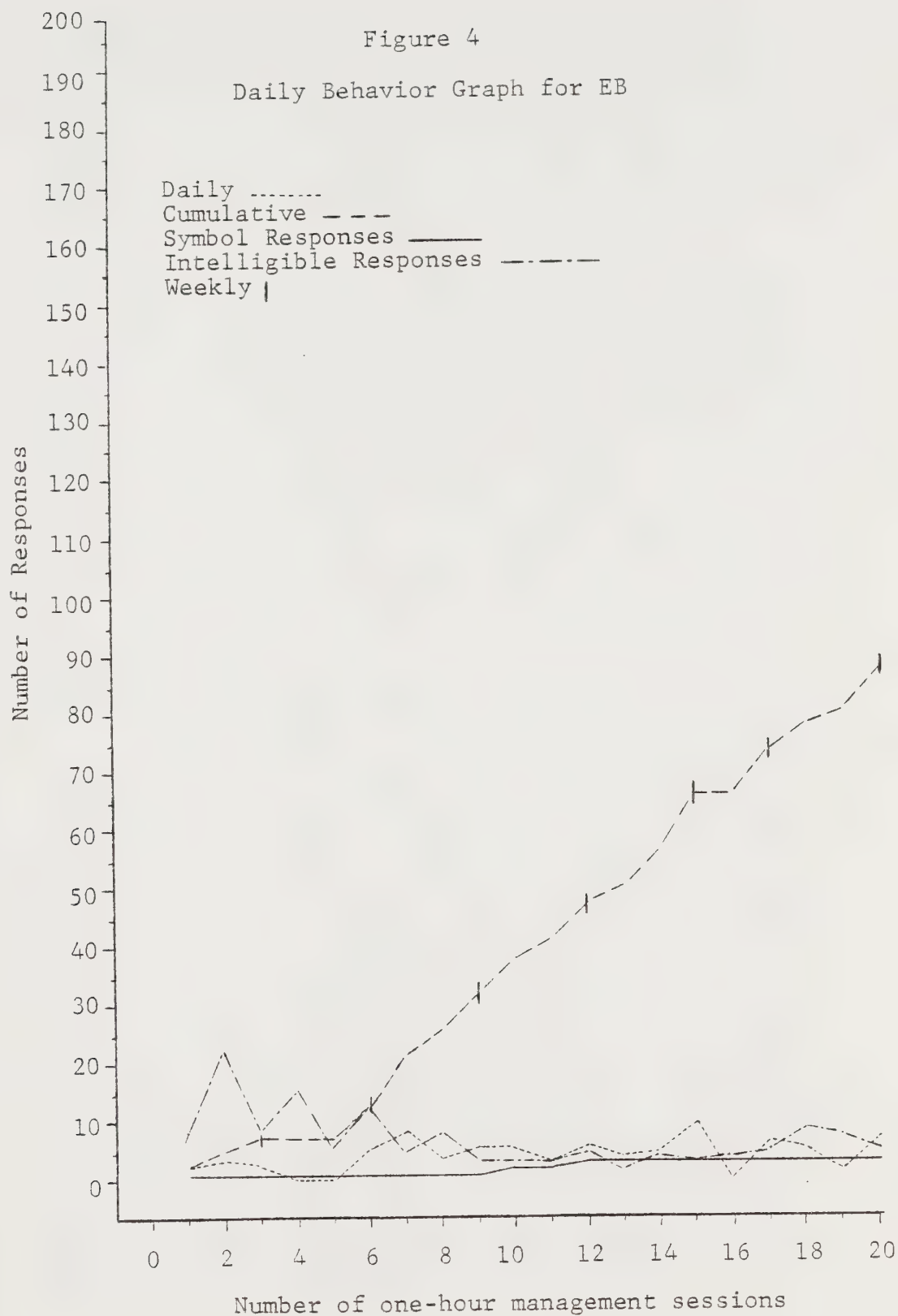
EB's conversational speech primarily consisted of unintelligible verbal responses characterized by varied phoneme production rather than a series of repetitive monosyllables. For the most part,

imitation of monosyllabic words produced intelligible but slightly distorted responses. Speech imitation on tasks involving polysyllabic words generally resulted in unintelligible responses. Automatic speech tasks, such as reciting her own name, numbers (1-10), days of the week, greetings, family member names, and spontaneous one-word vocalizations produced intelligible but slightly distorted responses. Most of the time, EB would nod her head or use some form of gesturing to communicate with her family. A severe receptive language impairment was indicated by results of the Token Test. Minimal reading skills were present (PICA Gestural subtest V and VII and FCP reading scores). Graphic skills for copying task (numbers, letters, geometric shapes of varying complexity) were good although written productions were somewhat distorted. Spontaneous writing from memory for numbers or words was poor, producing unintelligible written responses. The subject was able, however, to write her name intelligibly without any verbal or written cues.

Management Results

Number of Symbols Acquired:

EB acquired a cumulative total of 89 Bliss symbols after completion of 20 one-hour management sessions (Table 4, p. 80, Figure 4). Daily Bliss symbol acquisition ranged from 0-10, with an average daily symbol acquisition rate of approximately five symbols,



excluding data for Sessions 4, 5, and 16 where no new symbol acquisition was observed. In Session 4 and 5, EB experienced some initial difficulty in understanding the concept of matching the symbol with the associated meaning, i.e., through presentation of pictorial, gestural, verbal and/or graphic stimuli. Therefore, additional practice and review was required in matching each Bliss symbol with the associated meaning, in order that EB could firmly establish the relationship between the two. By allowing additional practice time with the initial seven symbols, subsequent acquisition was more consistent and easier for the subject. The subject was ill during Session 16, which resulted in no new Bliss symbol acquisition. As shown in Figure 4, a slow rate of change for the initial three sessions was observed. After using two sessions for practice and review, the symbol acquisition rate for the next 10 sessions (Sessions 6 through 15) showed an increasing positive change which occurred at a fairly constant rate. In Session 16, there was no demonstrated growth change due to EB's illness. As seen in Figure 4, symbol acquisition beginning with Session 17, increased but more gradually than previous change. The investigator felt that this more gradual increase in symbol acquisition rate was a direct result of the 100-word vocabulary display being introduced into the

management program at that time. Prior to using the 100-word display, EB utilized an index card collection devised by the investigator which displayed each Bliss symbol and its corresponding meaning. Simply by flipping each card, EB had easy access to each symbol previously learned. Her husband reported this collection was carried with her both in and out of the home setting. As represented by the cumulative gains reported in Table 4, and graphically shown in Figure 4, Bliss symbol acquisition over the 20 management sessions showed an initially slow rate of change, then gradually increased to a more constant growth rate, and finally exhibited a slowing down of the growth process.

Number of Symbols to Generate a Response:

The number of Bliss symbols used in generating a syntactically and semantically accurate response, increased over the 20 management sessions (see Table 4). For example, during the first nine sessions, an individual Bliss symbol indicating a single word, i.e., noun, personal pronoun, verb, or vocabulary item, was used to respond. In Sessions 10 and 11, two Bliss symbols were used to formulate a response. These two-word combinations comprised the syntactic structure of "MAIN VERB-DIRECT OBJECT" and "SUBJECT PRONOUN-MAIN VERB." During the next nine sessions (Session 12 through 20), three Bliss symbols were used. The

three-word combinations consisted of the syntactic structure "SUBJECT PRONOUN-MAIN VERB-DIRECT OBJECT or OBJECT PRONOUN." For example:

 I	 want	 water.
subject pronoun	main verb	direct object
 I	 need	 you.
subject pronoun	main verb	object pronoun
 I	 need	 toilet.
subject pronoun	main verb	direct object

For additional practice, the two-and three-word Bliss symbol combinations presented in the sessions were placed on a single index card for inclusion in the index card collection. Therefore, less manipulation of the cards was required for a desired communication response. EB exhibited great difficulty constructing the two-and three-word Bliss symbol combinations using the 100-word vocabulary display. Based on data given in Table 4, and shown in Figure 4, a plateau developed at integration of the Bliss symbols into a syntactically and semantically correct linguistic structure requiring three word combinations. At the conclusion of management, EB consistently used syntactically and semantically

correct responses, using a minimum of three Bliss symbols. As with the previous subjects, there was variety in the symbols and linguistic structures employed. Bliss symbol usage, however, was restricted to the index card collection.

Number of Intelligible Responses:

In Table 4 (p. 80) and Figure 4, a session-by-session report of the number of intelligible responses produced by EB while simultaneously pointing to a Bliss symbol or series of symbols, is displayed over 20 sessions. EB emitted a total of 141 intelligible verbal responses, ranging from 2 to 23 daily, with an average of seven intelligible verbal responses per session. Throughout the instruction period, EB had to be reminded to vocalize every time a pointing response was required. As shown in Table 4 and Figure 4, the majority of intelligible verbal responses (99 of 141) or 70 percent occurred in the first nine sessions. This coincided with a single word combination or one Bliss symbol response required of the subject. When two and three Bliss symbols were used to generate a response, her intelligible vocalizations decreased. From Sessions 16 through 20, however, a progressive increase in verbal intelligibility was demonstrated. On three different occasions, EB produced a 2-3 word intelligible verbal response while pointing to Bliss symbols. No

tension in the vocal mechanism or oro-facial area or drooling was observed when EB attempted to vocalize and point to the symbols simultaneously. When she attempted to speak without the pointing response, a mild amount of drooling and some tension in the oro-facial area occurred.

Investigation Interview

The pre- and post-investigation interviews were conducted with EB's husband in their home. According to the informant, EB was generally a content person, occasionally exhibiting periods of depression. The informant stated, "Sometimes she cries, but doesn't know why." It was reported that on occasion, EB experienced frustration and anger, particularly when "Something doesn't go right," or "She can't communicate what she wants." Prior to Bliss symbol management, the informant observed that EB had an indifferent attitude toward herself and her physical problems and a negative attitude toward her speech problem. It was reported that sometimes EB appeared ashamed or embarrassed about her disability and always seemed to feel sorry for herself. Although she enjoyed being with people, she did not like expressing herself and gave up easily when trying to communicate with others. Communication with the family consisted of pointing or yes/no responses; however, she did not usually

attempt any communication with friends or strangers. The informant reported that EB often began to cry when she found herself in a situation of trying to communicate and being unable to achieve listener comprehension. As a result, she exhibited little tolerance and much tension and embarrassment when attempting communication with others. According to the informant, EB did not channel any energies into her recovery, stating, "She doesn't try as hard as she used to. She has given up." Although occasionally she showed some semblance of independence (tried to dress herself or do some small household chores), little motivation for purposeful activity was observed in the home. The informant described his wife as not always in control of her emotions, occasionally having temper tantrums but never exhibiting physical violence. The informant also reported that EB did not dwell on her disability but had not seemed greatly interested in her recovery. It also was observed that she had not always dealt with her problems realistically and had not fully accepted the limitations placed on her by her disability. According to the informant, this lack of acceptance or realistic approach to her disability made coping with her problems much more difficult.

In the post-management interview, some changes in the subject's behavior were reported by the

informant. EB's interest in channelling her energies toward recovery appeared to increase almost at the onset of the program. The informant observed that EB had a more positive attitude toward herself and her disability and did not put so much energy into feeling sorry for herself. Frustration and tension during communication attempts decreased and his wife appeared more tolerant when communicating with others. She continued to use her habitual method of communication, i.e., pointing or head nodding, but in addition would "always try to say a little." Occasionally, she would utilize the index card collection of Bliss symbols, not as a last resort to communication, but more as a result of feeling acceptance and interest on the part of the listener. She used the symbols to a minimal degree with her husband but enjoyed using them with her relatives. The informant reported that EB did not use the symbols with other than family members. According to the informant, EB spent a great deal of time practicing the written production of the symbols and enjoyed completing the written homework assignments provided by the investigator. When people tried to communicate with EB, less crying behavior was observed and she did not give up her attempts at communication as easily as before. The informant described EB as more motivated as a result of Bliss

symbol acquisition, spending most of her free time writing the symbols and less time alone and being bored. The informant also observed a decrease in temper tantrums and more control of her emotions. Since learning the symbols, a renewed interest in her recovery developed. This renewed interest in herself provided EB with the motivation to learn a more pragmatic approach to cope with her disability. From the onset of the management, it was reported that she appeared to realize the need for this alternative/augmentative system. The informant admitted not being very interested in the potential usefulness of such a system, but her husband indicated, however, that the use of the Bliss symbols allowed EB an alternative solution to her communication problems. The informant summarized his feelings regarding EB's symbol acquisition as follows: "The Bliss symbols have helped her general knowledge increase and her speech has improved."

Pre- and Post-Management Test Results

Porch Index of Communicative Abilities (PICA)

Pre- and post-PICA test results for the three subtests (Gestural, Verbal, Graphic), and the Overall Score, are presented by subject in Table 5. Also given is the net change for pre- and post-PICA scores, and direction of change.

Table 5. Pre- and post-PICA test scores and corresponding amount of change.

Subject	PICA	Overall	Gestural	Verbal	Graphic
BW	Pre-test	9.00	13.52	5.82	7.65
	Post-test	9.47	13.52	6.40	8.50
	Change	+.47	0.0	+.58	+.85
HM	Pre-test	7.20	11.40	3.20	7.00
	Post-test	8.41	13.10	3.10	9.02
	Change	+1.21	+1.70	-.10	+2.02
MH	Pre-test	5.02	7.00	3.00	5.06
	Post-test	5.77	8.50	3.50	5.31
	Change	+.75	+1.50	+.50	+.25
EB	Pre-test	4.80	6.30	3.00	5.00
	Post-test	5.70	6.90	3.70	6.45
	Change	+1.10	+.60	+.70	+1.45

The pre- and post-management subtests and the Overall scores for each subject were compared utilizing a one-factor analysis of variance for repeated measures. A summary of the results of these tests are presented in Table 6.

Table 6. Summary of one-factor analyses of variance for repeated measures statistical procedure for pre- and post-management PICA test scores.

Source of Variation	SS	df	MS	F
PICA Overall Score	1.39	1	1.39	.43
Within	22.65	7	3.24	
Total	24.04	8		
PICA Gestural Subtest	1.80	1	1.80	0.18
Within	69.09	7	9.87	
Total	70.89	8		
PICA Verbal Subtest	.36	1	.36	.20
Within	12.49	7	1.78	
Total	12.85	8		
PICA Graphic Subtest	2.61	1	2.61	1.26
Within	14.56	7	2.07	
Total	17.16	8		

The F value required for significance at the required .05 level for one and seven degrees of freedom was 5.59. Comparison with the F values summarized in Table 6 clearly indicates a lack of significance.

Functional Communication Profile (FCP)

Pre- and post-management FCP overall scores are presented by subject in Table 7. Also listed is the net change that occurred between the pre- and post-FCP scores and direction of change.

Table 7. Pre- and post-management FCP overall scores for each subject and corresponding amount of change.

Subject	Pre	Post	Change
BW	59.8	71.5	+ 11.7
HM	38.4	45.4	+ 7.0
MH	21.0	27.0	+ 6.0
EB	23.2	27.5	+ 4.3

Due to the fact that the overall score on the FCP is a percentage, the pre- and post-management FCP overall scores were compared statistically utilizing the nonparametric Wilcoxon signed-ranks test (Spence, et al., 1976). The obtained T value of 0 is below that required for significance at the required .05 level. These results indicate a significant change in functional communication skills when performance is compared before and after 20 hours of management.

DISCUSSION

The areas to be discussed will be presented in the following order: number of symbols acquired, rate of symbol acquisition, level of symbol integration into linguistic responses, number of intelligible verbal responses, pre- and post-management test results, non-speech-language behaviors, and comparison with previous research.

Number of Symbols Acquired

Across 20 one-hour management sessions, all four essentially nonverbal apraxic-aphasic subjects demonstrated acquisition and use of the Bliss symbol communication system. As shown in Table 8, the total number of Bliss symbols learned by subjects varied. In evaluating the results of the study, the investigator noted with interest the positive relation that appeared present among subject data for the total number of acquired symbols, Overall and Gestural Subtest Scores on the pre-management PICA, and Token Test results. By rank ordering data according to total number of symbols acquired by subjects, some descriptive comparisons were possible. The Overall and Gestural Subtest scores on the PICA and the Token Test results followed the same rank ordering (see Table 8).

Table 8. Overall and Gestural subtest scores on the pre-management PICA, and Token Test results across four subjects, based on a ranking of total number of acquired symbols.

Subject	Cumulative Symbol Acquisition	PICA Overall	PICA Gestural Subtest	Token Test
BW	182	9.00	13.52	138
HM	139	7.20	11.40	103
MH	115	5.02	7.00	89
EB	89	4.80	6.30	43

The better the subject's receptive language skills and general communicative ability, the greater the number of symbols acquired.

As evidenced by scores on the PICA Gestural subtest V and VII and the FCP reading scores, varying degrees of reading capabilities across all four subjects were demonstrated. The extent to which reading of the word beneath the symbol is a factor in correct symbol identification was not measured.

Rate of Symbol Acquisition

In this section, rate of symbol acquisition is discussed across all four subjects with special attention to those factors related to how quickly or slowly the subject learned the symbols. The rate of acquisition varied from subject to subject on a daily basis, but weekly and cumulative acquisition was more consistent. For the most part, all four subjects demonstrated a gradual increase in the total number of symbols acquired, with a fairly constant rate of change exhibited over the 20 sessions, yielding an approximately linear positive rate of change.

As each subject became more comfortable using the symbols and understanding the type of required responses, symbol acquisition appeared to increase more rapidly. From the beginning of management, BW, who learned the greatest number of symbols, experienced little difficulty in associating the symbols with their

corresponding picture stimuli. EB, however, experienced some difficulty with this matching task at the onset of the program. During Session 4 and 5, EB required intense review of previously learned symbols through additional practice in matching the symbols with their associated picture stimuli. EB's initial comprehension of the symbols and how to use them proved difficult and caused her some frustration. After two sessions of intensive review and practice, however, an increase in the number of symbols learned in a one-hour session was observed. This increase in symbol acquisition continued across subsequent sessions, excluding Session 16 when she was ill. Illness was a factor which also was evidenced in MH's daily acquisition. In Session 8, no new acquisition occurred due to illness, or during Session 13, due to wife's illness. For all four subjects, the investigator observed a poorer performance on those days in which the subjects were physically ill.

Another consideration which was judged to be a factor in learning the Bliss symbols was the homework assignments required of each subject. This assignment required 10 written productions of each newly learned Bliss symbol, and a minimum of one hour of practice using the symbols with another individual. BW, HM, and EB were able to complete the written

assignments but MH, the only subject residing in a nursing home, was not able to do the written homework. MH, who was unable to do the written homework assignments, demonstrated the least amount of change between the pre- and post-graphic subtest scores. In the impression of the investigator, additional writing practice with the Bliss symbols assisted the subjects in learning the symbols and also was associated with some improvement in graphic skills, despite the fact that the measured change fell short of the required level of significance.

Amount of time spent in Bliss symbol practice varied with degree of cooperation among significant individuals in the immediate living environment. BW, HM, and EB, who lived at home with their spouses, were not consistent in completing the required one-hour practice time as with their written assignments. In terms of support for learning the symbol system, BW's wife was judged by the investigator most cooperative, HM's less cooperative, and EB's husband, who admitted to the investigator almost no interest in the symbol system, the least cooperative. Although MH did not have a specific individual with whom he could communicate, it was reported by the nursing home staff that MH always carried his index card collection of Bliss symbols with him, spent much time looking at the

symbols, and practiced using them with nursing home personnel and/or his wife and family when they visited.

Level of Symbol Integration into Linguistic Responses

In addition to the number of symbols acquired and the rate of symbol acquisition, an attempt was made to evaluate the ability of subjects to integrate Bliss symbols into syntactically and semantically correct responses, and to assess the level of integration attained. Each subject demonstrated the ability to incorporate the acquired symbols into syntactically and semantically correct responses. The level of integration varied among subjects, and ranged from three to six Bliss symbols. A rank ordering of number of Bliss symbols used to generate a response, corresponded to measured levels of receptive language capabilities, and overall communicative skills. By the end of management, BW consistently used six Bliss symbols to respond, HM four symbols, MH and EB three symbols. It appears, therefore, that the more complex the linguistic response, i.e., the number and type of word combinations required, the better the subject's receptive language and general communicative skills had to be.

Another consideration was the skill required to locate the symbols on the 100-word vocabulary display, and to arrange them into correct linguistic order. BW demonstrated little difficulty locating and organizing

the symbols on the 100-word display. In fact, he began using the 200-word vocabulary display in Session 15. HM experienced more difficulty with the 100-word display, followed by EB, and then MH, who experienced the greatest degree of difficulty. For EB and MH, the most effective method for facilitating utilization of the symbols into a syntactic and semantically correct response, and thus making the system more functional, proved to be implementation of the index card collection of Bliss symbols. The collection was provided for each subject's use at home--with the investigator's initial purpose being a method of practicing and reviewing newly learned symbols. BW and HM only used the collection until introduction of the 100-word vocabulary display. Due to EB and MH's observed difficulty with the display, it was not unexpected that continued use of the collection was reported subsequent to presentation of the display. It was felt that writing the combinations of symbols learned in the sessions on an individual index card, and including them in the collection, facilitated use of the system for EB and MH.

Number of Intelligible Verbal Responses

Although not a formal question of this study, the investigator considered that by evaluating the number of intelligible verbal responses produced by each subject, information regarding the Bliss symbol

communication system's effects on verbal skills might be provided. This may be seen in a rank ordering of the number of intelligible productions, compared with a similar ordering of post-management PICA verbal subtest scores.

<u>Subject</u>	<u>Total Number of Intelligible Verbal Responses</u>	<u>Post-PICA Verbal Subtest Scores</u>
BW	862	6.40
EB	141	3.70
MH	31	3.50
HM	9	3.10

Those subjects exhibiting the most apraxia had fewer intelligible responses; however, when intelligible responses were produced, they occurred in conjunction with a pointing response. For all subjects, pointing to the Bliss symbols appeared to facilitate speech intelligibility, a result consistent with the findings of Harris-Vanderheiden (1976). It appeared that by concentration on a pointing rather than a verbal response, tension in the oro-facial area decreased and speech intelligibility increased. Also, it should be noted that for EB and MH, less drooling behavior was observed when a pointing and vocal response simultaneously occurred.

Pre- and Post-Management Test Results

Although not significant, there were changes in pre- and post-PICA overall and subtest scores. With the exception of BW's gestural subtest (no change) and HM's verbal subtest (negative change), all other scores evidenced a positive direction of change. It should be noted that all four subjects showed a great deal of apprehension during administration of the PICA which might be a factor in the outcome of both pre- and post-test scores. For example, BW, who consistently was producing two to three intelligible words during each symbol response, demonstrated for the most part inaccurate verbal production on the post-PICA. In the opinion of the investigator, there is a possibility that some depression of test findings might be related to test anxiety, since some of the observed test behavior was not in keeping with demonstrated skills in management. The quantitative changes in test scores are considered to represent a very conservative estimate in net change in the opinion of the investigator, when a comparison is made of management session achievement and the outcome of a formal testing procedure.

The pre- and post-FCP score comparison yielded a significant difference in functional communication skills for subjects as a result of Bliss symbol acquisition. This represented an improvement in overall

functional communication skills and supports use of this alternative/augmentative communication system as a viable supplement to an existing deficient method of communication. After it was observed that each subject could in fact learn the symbols and use them in an accurate linguistic response, the investigator's primary responsibility was in choosing the most effective method for making the system functional in their individual living environment. This was accomplished by BW and HM through utilization of the 100-word vocabulary display and for MH and EB through use of the index card collection of Bliss symbols.

Non-Speech Language Behaviors

From the original conception of the study, the investigator considered that changes in non-speech-language behaviors would occur if a more functional means of communication was provided. All four subjects exhibited distinct behavioral changes during Bliss symbol acquisition. These observed changes were reported by the subject's spouses who served as informants for the pre- and post-management interviews. These interviews also served to evaluate each subject's use of the system outside the management session, and thus to provide information regarding level of Bliss symbol usage.

As reported, all subjects demonstrated an increased desire to communicate with others, as well as a desire not to give up so easily during communication attempts. Although MH was the only subject who used the symbols with individuals other than family members, this probably is because MH was the only subject residing in a nursing home and had almost exclusive exposure to nonfamily members. For all subjects, it also was reported that the number of times they were understood during communication attempts increased. This resulted in less reported frustration and increased tolerance when communicating with others. Since vocalization was encouraged along with the required gestural response, the subject's primary focus was on symbol selection; not on formulation of speech sounds. As a result, less tension in the oro-facial area was observed during speech production. For BW, MH, and EB, this produced increased verbal intelligibility, and subsequently, greater listener comprehension. It was noted for all subjects that as listener comprehension increased, enjoyment in using the system also increased. Consequently, the more each subject enjoyed Bliss symbol usage, the more motivation and interest was exhibited for continued symbol instruction. For EB and MH, less drooling, less emotional lability, and better control of emotion was observed.

According to informants, all subjects displayed a greater channelling of energy toward recovery, particularly for MH and EB whose habitual method of communication was generally unsuccessful. As reported, EB had "given up" and MH, who was often "bored and depressed," had more alone time than the other subjects. Both appeared happy and grateful to have something with which to occupy their time. It is important to note that both these subjects displayed medical histories revealing several previous left-hemisphere CVA's, with the most recent CVA occurring a minimum of one year prior to this study. It was felt that the Bliss symbol communication served two important functions for EB and MH, in addition to providing increased listener comprehension. They were: 1) to provide the subjects with something to occupy their time, i.e., through required written and practice assignments; and more importantly, 2) to develop a renewed interest in their recovery and themselves, i.e., motivation for learning a viable communication system to supplement their existing communication skills.

All four subjects did demonstrate an awareness of their individual needs for an alternative/augmentative communication system. Their need for such a system, however, was dependent on how successful their present habitual method of communication was, and how

realistically they dealt with their disability, if dealt with at all. Due to the greater number of different people in MH's environment, the necessity for a system that would allow more uniform communication of his needs, was obvious. Nursing home staff reported an increased ability to comprehend what MH was attempting to communicate. The Bliss symbols, with their corresponding English words printed directly beneath them, eliminated much of the "guessing" in responding to MH's immediate needs and allowed the staff to care more efficiently for their patient. Another consideration concerning MH's progress was his desire to "please" the investigator, perhaps to ensure return visits. MH always appeared happy at seeing the investigator, and according to the staff, would become nervous or upset if the investigator was even five minutes late. MH seemed to enjoy being around someone who was interested in helping him and was extremely grateful--at the end of each session the subject would take the investigator's hand, kiss it, and attempted to vocalize his "thanks." Not surprisingly, MH exhibited the greatest use of this system outside the management sessions, actively "seeking out" people with whom he could use the symbols.

Receptivity to usage of the Bliss symbol system also depended on degree of embarrassment experienced by

the subjects. Initially, all subjects, excluding MH, were embarrassed to use the system with family or friends. As knowledge and efficiency in symbol usage increased, each subject displayed less embarrassment and more ease when using the system outside the management session.

A key factor in Bliss symbol usage proved to be level of cooperation among individuals in the subject's present living environment. Nursing home staff were eager to find a way to more consistently understand what MH's needs were. MH's almost constant use of the index card collection of Bliss symbols provided the staff with an increase in listener comprehension they were needing. BW's family was extremely cooperative, spending time practicing and reviewing the symbols with him. As BW's knowledge and efficiency in using the system developed, a noticeable increase in speech intelligibility was observed. This resulted in an increased functional use of the symbol display in the home setting. HM's wife, who now was responsible for their business, was cooperative in assisting the subject with his required homework assignments, but only to the extent she had available time. HM's usage of the system was limited only to family members. When his habitual method of expressing himself failed after several attempts, he would use the 100-word vocabulary

display to convey his needs or feelings rather than giving up. EB's husband, who expressed little interest in the system, did not assist the subject with practicing Bliss symbol usage at home. As a result, EB's utilization of the system was minimal. However, among other family members who demonstrated an interest and acceptance of the system, EB's functional use of the system increased.

Comparison With Previous Research

Results from a recent study by a Canadian Speech-Language Pathologist (Saya, 1979), support the findings of the present investigation regarding the efficacy of Bliss symbol usage with nonverbal adult aphasics. In his study, 10 nonverbal adult aphasics who had not achieved functional communication after three months of traditional speech management, were presented the Bliss symbol communication system. After two months of Bliss symbol management, the 10 adults were divided into better Bliss symbol users (top five) and poorer Bliss symbol users (lower five). By making this classification, Saya was able to report several observations. First, he found that essentially nonverbal adult aphasics had the capabilities to acquire and utilize the symbol system; however, functional use of the system in the individual's living environment was not guaranteed. Secondly, as a result of specific

testing procedures, Saya concluded that better Bliss symbol users exhibited higher visual association and visual closure scores, than poorer Bliss symbol users. Finally, he concluded that the top five Bliss symbol users were younger, had suffered a CVA more than two years prior to the study, and were motivated to communicate, regardless of the method. Saya (1979) felt that for this nonvocal visual language system to become functional, both the "user" and the "listener" would need to be receptive to the system and be willing to be involved in a training program which concentrated on making the system functional outside the management session.

In comparing the results of the present study with those reported by Saya (1979), several similarities and differences are apparent. The results of both studies support the ability of the adult nonverbal aphasic to learn and use Blissymbolics. In both studies, it also was demonstrated that functional use of the Bliss symbol communication system in the subject's immediate living environment will not always result as a consequence of symbol acquisition. For both studies, level of functional use appeared to be dependent on degree of reliance and success of the subject's existing method of communication. As a condition for successful symbol acquisition, the

importance of motivation to communicate and receptivity of the "user" and "listener" to an alternative communication system was emphasized in both studies.

Since in the present investigation, a test for visual association and closure was not employed, comparison of symbol acquisition and usage with visual association and closure skills was not possible. Ability to locate the desired symbols with accuracy and efficiency on the 100-word vocabulary display was a difficult task for subjects EB and MH. Although not tested for "visual searching" abilities, it appears that the observed difficulty in scanning the Bliss symbol display might be related to specific deficiencies in these subject's visual comprehension skills.

In the present study, age of the subject was not related to ability to learn and use the system as was reported in Saya's (1979) study. For this investigation's four subjects, onset of CVA was associated with symbol proficiency, but in an opposite direction than that reported by Saya (1979). BW and HM, who evidenced the greatest number of symbols and acquired the highest level of symbol usage, had suffered a stroke less than one year prior to the onset of management. MH and EB, who suffered strokes more than a year prior to management, evidenced lower levels of symbol acquisition and usage.

In the investigator's judgment, both studies support the necessity and utilization of a nonvocal visual language communication system, Blissymbolics, in order to provide nonverbal adult aphasics with an alternative/augmentative communication system when their existing communicative skills are deficient. It is regarded that the findings of this study represent a conservative estimate of utilization of an alternative/augmentative communication system, considering the length of the management program and considering a variety of other factors identified in this chapter that are thought to relate to the level and rate of symbol acquisition.

SUMMARY AND CONCLUSIONS

SUMMARY

This study was concerned with assessing the acquisition of the Bliss symbol communication system by adult aphasics with severe oral and verbal apraxia, who have had a period of traditional language management involving a speech-response mode, and whose available speech consisted primarily of unintelligible spontaneous vocalizations and/or gross gestures. Replacing the required speech responses with a non-speech response mode was considered a logical management approach when minimal or no appreciable changes in functional communication skills were evidenced in

traditional language management. There is an almost complete absence of research and clinical literature on nonvocal rehabilitative approaches as alternative/augmentative communication systems for the essentially nonverbal adult aphasic. In only one prior investigation (Saya, 1979), was an attempt made to evaluate the Bliss symbol system with nonverbal, and nonapraxic adult aphasics. The purpose of that study was to determine if functional use of the Bliss system could be achieved, and what factors might predict good and poor Bliss symbol users.

In view of the limited research data and the absence of other relevant information dealing with nonverbal apraxic-aphasics, there exists a need to determine whether acquisition of the Bliss symbol communication system would occur and whether symbol acquisition would improve overall functional communication skills.

Four adult apraxic-aphasic subjects, one woman and three men, participated in a 20-hour language training program involving the introduction and implementation of the Bliss symbol communication system according to the Teaching Guidelines developed by McNaughton (OCCC, 1974), and incorporating LaPointe's (1977) Base 10 programmed stimulation design for aphasia management. The aphasic's skill in acquiring

this nonvocal response mode was assessed by determining the number of Bliss symbols acquired at the end of the 20 hours of management, rate of acquisition of the Bliss symbols on a daily, weekly and cumulative bases, and level of capability in integrating the Bliss symbol system into linguistic structures. Although not a formal question of the study, the number of intelligible verbal responses produced by subjects was tabulated on a daily basis. Descriptive treatment of these ongoing behavioral response data was employed.

To assess changes in speech-language behaviors as a result of symbol acquisition, pre- and post-management comparisons were made on the Overall score on the PICA and the three subtests (Gestural, Verbal, Graphic). These tests of mean difference were performed using a single classification analysis of variance procedure for repeated measures. In addition, significance of changes in pre- and post-management scores on the FCP were assessed using the Wilcoxon signed-ranks test, another procedure for evaluating speech-language behaviors. In an attempt to interpret changes in non-speech-language behaviors, as well as functional use of the system outside the management session, pre- and post-management interviews with an individual in the aphasic's immediate living environment were conducted.

Results

The following represent the results of the investigation utilizing the procedures described.

1. Based on descriptive analyses, the following four observations were made:

- a) All subjects were able to learn and use the Bliss symbol communication system. The total number of symbols acquired varied across subjects and it appeared that the better the subject's receptive language skills and general communicative ability, the greater the number of symbols acquired.
- b) The rate of symbol acquisition varied from subject to subject on a daily basis. For the most part, all subjects demonstrated a gradual increase in the total number of symbols acquired, with a fairly constant rate of change over the 20 sessions, yielding an approximately linear positive rate of change.
- c) The number of symbols used in generating syntactically and semantically correct responses, varied among subjects. Level of symbol integration into accurate linguistic responses also appeared to be related to level of receptive language capability and overall communication skills.

- d) The number of intelligible responses produced by subjects varied on a daily basis and appeared to be related to their overall verbal skills, those subjects exhibiting the most apraxia, having fewer intelligible responses. For all subjects, however, pointing to the Bliss symbols appeared to facilitate speech intelligibility.
2. Results of pre- and post-management comparisons of the PICA Overall and Gestural, Verbal, Graphic subtest scores were statistically non-significant.
 3. Pre- and post-management comparisons in the FCP scores resulted in a statistically significant difference in overall functional communication skills at the required alpha level of .05. This represented an improvement in overall functional communication skills across all four subjects.
 4. Descriptive treatment of pre- and post-management interviews for all subjects reflected positive and constructive changes in non-speech-language behaviors as well as varying degrees of functional use of the Bliss symbols in the subject's present living environment.

CONCLUSIONS

Limitations

Conclusions drawn from the results of the investigation are conditioned by a number of limitations

inherent in its design and conduct. One of these limiting factors is the small number of subjects studied. Other limitations include the following:

1) Generalizations made from the findings of this investigation are restricted to individuals with characteristics comparable to the adult aphasics studied and their varying levels of reading skills.

2) The findings should be evaluated within the constraint of the teaching method for the Bliss symbol communication system as applied by the investigator, i.e., according to the Teaching Guidelines developed by McNaughton at the OCCC (1974).

3) These data also are subject to the limitations imposed by reliability of a) tests utilized in the study, b) the investigator's degree of accuracy in reporting ongoing behavioral data, and c) the informant's accuracy in supplying objective information regarding subject use of the symbol system outside the management session.

4) The findings of this study are restricted to the length of time the subjects were exposed to the Bliss symbol management, and conditioned by the extent to which each subject participated in completing the daily minimum, required, practice times for symbol usage in their present living environment.

5) Two subjects were within the generally

accepted spontaneous recovery period, i.e., less than six months post CVA. Therefore, some improvement in functional communication skills could be attributed to this spontaneous recovery process, rather than being due exclusively to introduction and use of the Bliss symbol management program. The extent of the interaction is not known.

Conclusions

Within the limitations described the following conclusions are drawn:

1. Essentially nonverbal adult apraxic-aphasics are able to learn and use the Bliss symbol communication system with varying degrees of acquisition. It is suggested that the better the apraxic-aphasic's receptive language skills and general communicative ability, the greater will be the number of symbols acquired.
2. While there will be individual variability throughout a Bliss symbol management program, it is expected that the overall rate with which this nonvocal alternative/augmentative communication system is acquired will be reflected in an approximately linear positive rate of change.
3. While it is conditioned by an apraxic-aphasic's receptive language capabilities and overall communicative skills, Bliss symbols can be used by

them to formulate syntactically and semantically correct linguistic responses.

4. Within the limitations of an adult apraxic-aphasic's overall verbal skills, vocal responses may reflect an increase in speech intelligibility when occurring in conjunction with use of Bliss symbols.
5. Within the constraint of length of time in management, adult apraxic-aphasics may be expected to show significant gains in those skills measured by the FCP; however, comparable changes may not be evident when assessed using the PICA.
6. It may be expected that significant persons in the aphasic's immediate living environment will observe positive and constructive changes in non-speech-language behaviors concurrent with acquisition and usage of the Bliss symbol communication system.

The above conclusions are to be interpreted taking into consideration a number of other variables that are considered related to successful acquisition and use of the Bliss symbol system, as a supplement to the adult apraxic-aphasic's existing communication skills. First, the realization of need for an alternative/augmentative communication system as a result of recognized deficiencies in their present method of communication was a factor in symbol acquisition. Also, the amount and consistency in completion of homework

assignments (written and actual practice in symbol usage), degree of cooperation among individuals in the subject's immediate living environment for support in learning and using the symbol system, level of motivation and their desire to communicate, and amount of embarrassment in symbol usage, were observed to be factors in Bliss symbol acquisition. Utilization of Bliss symbols in the apraxic-aphasic's present living environment was related to the investigator's ability to find the most effective method in making the symbol system functional for each subject. Finally, an acceptance of Bliss symbol usage by both the "user" and the "listener" proved to be a crucial element in successful acquisition and use of this alternative/augmentative communication system as a viable supplement to an existing deficient method of communication.

Suggestions for Further Research

- 1) To facilitate and increase Bliss symbol usage, a separate and individualized training program which emphasizes functional use of the symbols outside the management session should be developed for the nonverbal adult aphasic and those individuals in their immediate living environment.

- 2) To determine if management would be more effective if utilized for a longer period and in a more

extensive manner, such as five times a week, but with 30 minute sessions.

3) It would be valuable to determine what are the minimal skills, e.g., auditory comprehension, visual association, closure, and matching, intelligence, etc., required by an adult aphasic in order to learn and use the Bliss symbol system.

4) To also determine what effect the adult aphasic's pre-morbid educational background, professional experience, medical, social, and psychological history and post-morbid physical, emotional and family situation have on the acquisition of the system.

5) To aid in the selection of subjects who would benefit most from this management approach, those characteristics of adult aphasics that correlate with a moderate to high efficiency in acquisition and usage of this particular nonvocal visual language system should be identified.

6) In order to counterbalance the effects that consecutive morning or consecutive afternoon sessions may have on the subjects, it is recommended that the sessions be alternated.

7) Because it is possible that the investigator's bias toward eliciting an anticipated trend in responses might affect the reliability of the response data, it is recommended that unbiased observers experienced in aphasia management and the Bliss symbol

communication system observe randomly selected sessions in which data on the subject's responses is taken along with the investigator. This procedure might attempt to verify data collection and control the possibility of error.

8) To evaluate in greater depth the extent of symbol acquisition, e.g., the maximum number of symbols that can be acquired, degree of complexity with respect to integration into linguistic structures, what symbols and symbol strategies are the easiest and hardest for the adult aphasic to learn.

9) To determine if more effective methods for increasing functional use of the symbol system in the present living environment are available.

10) It is recommended that all subjects be required to be at least six months post CVA, since available data indicate that beyond six months, improvement in communication skills for aphasics is not a function of spontaneous recovery. Therefore, any improvement in functional communication skills would be due to the management program to which the subject is exposed rather than expected self-improvement.

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APPENDIX A: Letter from S. McNaughton

(Program Director at
Ontario Crippled Children's
Centre)

APPENDIX A

LETTER FROM S. MC NAUGHTON



Blissymbolics
Communication
Foundation

→ gathering
⇄ dissemination
⊗ blissymbolics
x much, many

882 Eglinton Avenue E.
Toronto, Ontario
Canada M4G 2L1
(416) 425-7835

November 1st, 1977.

Mary Jane Rahbar,
200 North Zelta,
Wichita, Kansas,
76206, U.S.A.

Dear Ms. Rahbar:

We thank you for your letter of September 26th, 1977, and do apologize for our tardy response.

We are enclosing our current literature, on the general application of Blissymbols, along with a copy of "Hemi/Sphere." To date, this is the only Blissymbol programme involving an adult aphasic population of which we are aware. *(which has been organized & which is on-going.)*

We would also refer you to, "Visual Communication in Aphasia," Gardner, H., et al., Aphasia Research Center, Boston University School of Medicine, Boston, Mass., which utilizes another symbol system, but which does outline pre and post test measures and procedures in language structure.

A fall Workshop schedule is also enclosed for your future reference.

Your interest in Blissymbols is appreciated, and if we can be of any further assistance to you, please do not hesitate to contact us.

Sincerely,

Shirley McNaughton.
Programme Director.

SM/bq
Encl.

APPENDIX B: Permission Forms

SECTION I: Cover Letter

SECTION II: Trainee and/or Responsible
Party Consent

SECTION III: Nursing Home Staff and/or
Physician Consent

APPENDIX B, SECTION I: COVER LETTER

Title: Assessment of the Bliss Symbol Communication
System for Adult Aphasics with Severe
Oral and Verbal Apraxia

The Bliss Symbol Communication System is a visual language system which utilizes a nonvocal response mode. This study will attempt to assess whether a nonvocal method of communication, Blissymbolics, can be acquired by adult aphasics who have essentially no functional speech skills at the onset of this language training program. The second purpose of the study is to determine whether changes in speech and language areas will occur as a result of acquiring the Bliss Symbol System. The study will also attempt to demonstrate any qualitative changes in non-speech/language areas as a result of acquisition of this alternative/augmentative communication system.

The program will consist of 20 management hours with 50 minute sessions scheduled three times per week. All management sessions will be conducted by the investigator, Mary Jane Rahbar, a graduate student in the Department of Logopedics at Wichita State University. This investigation of the Bliss Symbol System with adult apraxic/aphasics is an approved thesis design for research and is under the direction of Dr. Kenneth W. Burk of the Department of Logopedics. I understand that withdrawal from the program is possible at any time during the six to eight week training period.

APPENDIX B, SECTION II: TRAINEE AND/OR
RESPONSIBLE PARTY CONSENT

Department of Logopedics
Wichita State University

BLISS SYMBOL COMMUNICATION SYSTEM TRAINING PROGRAM

Trainee/Responsible Party Consent for Education
Participation

I, _____, hereby agree to participate in the evaluation of the Bliss Symbol Communication System training program. The attached explanation of procedures has been read to me, the general purposes of the study have been explained, my questions have been answered, and I understand the nature of my participation. I also understand that if additional questions develop, I may ask the investigator for further elaboration and that I may withdraw from participation at any time.

Date

Trainee (or Designate)
Signature

Date

Responsible Party (or
Designate) Signature

I have explained the study to the trainee, and the nature of his/her participation.

Date

Investigator

APPENDIX B, SECTION III. NURSING HOME STAFF
AND/OR PHYSICIAN CONSENT

Department of Logopedics
Wichita State University

BLISS SYMBOL COMMUNICATION SYSTEM TRAINING PROGRAM

Nursing Home Staff/Physician Consent for Evaluation
Participation

I, _____ have
read the attached description of the investigation which
explains the general purposes and outline of this thesis
research study and agree to allow _____
(Name of Subject)
to participate in the evaluation of the Bliss Symbol
Communication System training program conducted by
Mary Jane Rahbar under the Direction of Dr. K.W. Burk
in the Department of Logopedics at Wichita State Uni-
versity. I understand that I can ask for the patient's
withdrawal from the program at any time if I deem it
necessary for medical reasons.

Date

Nursing Home Staff Signature

Date

Physician Signature

APPENDIX C: Pica Modality Response Contour

APPENDIX C

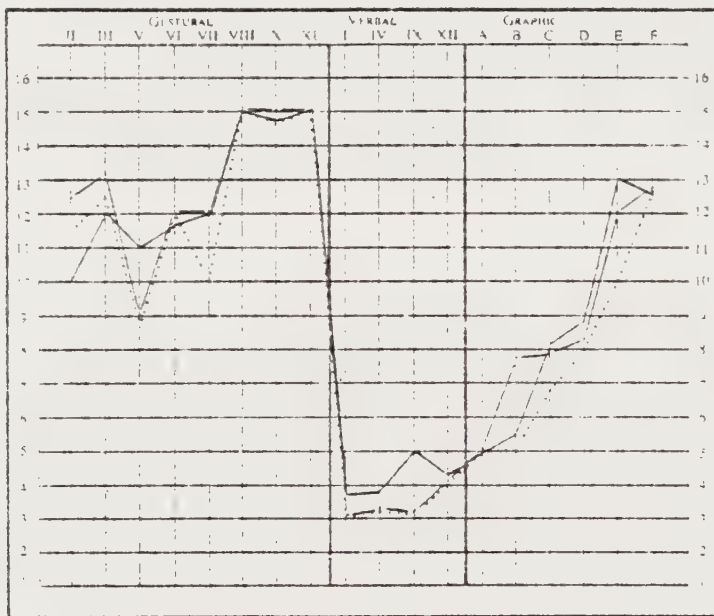
PICA MODALITY RESPONSE CONTOUR

(From Porch, 1973, p. 95)

Modality Response Contours*Porch Index of Communicative Ability*

MODALITY RESPONSE SUMMARY

Name M. C. Case No. _____
 Age 60 Birthdate 3-28-05 Sex F Race W Handedness (R) (L)
 Diagnosis CVA - Aphasia Onset 1-15-65
 Date 3-11-65 Overall 9.50 Gestural 12.63 Verbal 4.13 Graphic 5.83
 Date 6-10-65 Overall 9.54 Gestural 12.95 Verbal 3.53 Graphic 5.95
 Date 5-24-66 Overall 8.94 Gestural 12.43 Verbal 3.48 Graphic 7.93



Note _____



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 577 College Avenue Palo Alto, California

APPENDIX D: Case Study Information
For Each Subject

APPENDIX D

CASE STUDY INFORMATION FOR EACH SUBJECT

Subject BW

- 65-year-old married male residing at home.
- 35 years with railroad; presently retired.
- High school education plus two years of college.
- First CVA (Nov. 1977); previous history of cancer of lymph glands.
- 4 months speech-language management (twice a week) begun one month post-CVA.
- Handedness prior to stroke: right
- Token Test Results: Score-138; Percentile Rank-66%;
Classification: Mild Impairment
- Pure-tone Hearing Screening Results: within normal limits for age. For frequencies 250 Hz, 500 Hz, 1 K, 2 K, and 4 K -- no hearing loss noted. Moderate loss at 8 K.
- PICA Modality Response Curve: characteristic of aphasia with severe formulation difficulty.
Gestural Subtest: 13.52
Verbal Subtest: 5.82
Graphic Subtest: 7.65

Subject HM

- 59-year-old married male residing at home.
- Farmer all of his life until stroke.
- High school education.
- First CVA (Dec. 1977); no previous medical problems prior to stroke.
- 4 months speech-language management (twice a week) begun two weeks post-CVA.
- Handedness prior to stroke: right
- Token Test Results: Score-103; Percentile Rank-44%;
Classification: Moderate Impairment.
- Pure-tone Hearing Screening Results: within normal limits for age. For 250 Hz, 500 Hz, 1 K and 2 K--no hearing loss noted. Moderate loss at 4 K. Severe loss at 8 K.
- PICA Modality Response Curve: characteristic of aphasia with severe formulation difficulty.
Gestural Subtest: 11.40
Verbal Subtest: 3.20
Graphic Subtest: 7.00

APPENDIX D (Continued)

Subject MH

- 68-year-old married male residing at nursing home.
- Electrician prior to first stroke.
- 6th grade education.
- History of several CVA's; also, diabetes, repaired fracture of right hip, and other medical problems.
- Extensive speech-language management since initial stroke (unable to obtain date--over 10 years prior).
- Handedness prior to stroke: right
- Token Test Results: Score-89; Percentile Rank-40%;
Classification: Moderate Impairment.
- Pure-tone Hearing Screening Results: within normal limits for age. For frequencies 250 Hz, 500 Hz, 1 K, 2 K--no hearing loss noted. Severe loss at 4 K and 8 K.
- PICA Modality Response Curve: characteristic of aphasia with severe formulation difficulty.
Gestural Subtest: 7.00
Verbal Subtest: 3.00
Graphic Subtest: 5.06

Subject EB

- 60-year-old married female residing at home.
- Worked as a seamstress at airplane factory prior to war. Housewife since that time.
- High school education.
- Three CVA's (1965, 1976, 1977); adrenal gland tumor removed (1965); no other medical problems.
- Periods of speech-language management subsequent to each stroke (husband unable to report length of management periods).
- Handedness prior to stroke: right
- Token Test Results: Score-43; Percentile Rank-12%;
Classification: Severe Impairment.
- Pure-tone Hearing Screening Results: within normal limits for age. At 250 Hz, 500 Hz, 1 K and 2 K--mild hearing loss noted. Moderate loss at 4 K and 8 K.
- PICA Modality Response Curve: characteristic of aphasia with severe formulation difficulty.
Gestural Subtest: 6.30
Verbal Subtest: 3.00
Graphic Subtest: 5.00

APPENDIX E: Letter from R. Kukol

(Assistant Professor, Hearing
and Speech Science Department,
State University of New York,
College of Plattsburgh)

APPENDIX E

LETTER FROM R. KUKOL



STATE UNIVERSITY OF NEW YORK
College at Plattsburgh

Faculty of Arts and Science
Speech and Hearing Center
(518) 564-2170

October 17, 1977

Dr. Kenneth W. Burk
Department of Logopedics
Wichita State University
Wichita, Kansas 67208

Dear Dr. Burk:

During the summer of 1975, I had the opportunity to work with Marty Whitenbach and for the Institute of Logapedics in their hospital program. While employed by the Institute, I instructed Marty on the administration, scoring and interpretation of the Porch Index of Communicative Ability (PICA) by Bruce E. Porch Ph.D. In addition, I supervised Marty during the administration of ten tests on various subjects, and reviewed the procedures, scoring and results with her.

These procedures are in keeping with the guidelines set forth by Dr. Porch for the training of clinicians in the administration of the PICA. On the basis of Marty's level of instruction and performance, I find her to be qualified in the use of the PICA as a test instrument.

Should you have further queries regarding Marty's training, please contact me at your convenience.

Cordially,

A handwritten signature in cursive script, reading 'Robert J. Kukol'.

Robert J. Kukol
Asst. Professor
Hearing and Speech Science

APPENDIX F: Pre- and Post-Investigation
Interview

APPENDIX F

PRE- AND POST-INVESTIGATION INTERVIEW

Unless otherwise indicated, the investigator will ask the individual to respond to each question utilizing the following answer possibilities--always, most of the time, occasionally, never. All questions will be read by the investigator to the individual and the opportunity for further elaboration on any answer will be allowed.

I. Mood:

1. Do you regard _____ a happy and
(Name)
contented person:
2. Does the patient appear bored?
3. Does the patient appear depressed?
4. Does the patient experience frustration?
If so, when?
5. Does the patient ever look worried?
6. Does the patient appear angry? If so, when?

II. Attitude:

1. Do you feel the patient has a positive, negative or indifferent attitude toward himself?
_____ his physical problem? _____
his speech problem? _____
2. Does the patient appear ashamed or embarrassed about his disability?
3. Does the patient appear threatened? If so, when?
4. Does the patient appear to feel sorry for himself?

III. Willingness to interact with other individuals in their environment:

1. Does the patient prefer to be alone or with people?

APPENDIX F (Continued)

2. If dependent on people in his/her immediate environment, does patient accept the dependency?
3. Does patient appear isolated from the world around him/her?
4. Does patient express his/her feelings?
5. Does patient appear to enjoy expressing himself/herself to family/friends?
6. How does patient express himself/herself?
7. How does patient respond when people try to communicate with him/her?
8. Does he/she give up easily when trying to communicate? If so, to what degree?
9. Does patient appear tolerant when communicating with others?
10. Does patient experience tension when attempting communication with others?

IV. Level of Aspiration:

1. Do you feel patient is channelling his/her energies toward recovery?
2. Does the patient exhibit any degree of motivation in order to carry out purposeful activity? e.g., helping around the house.
3. Does the patient engage in any hobbies or outside recreational activities? e.g., playing cards, puzzles, watch TV, walking, checkers, stamp albums, etc.
4. Does the patient desire to be independent? e.g., dress himself/herself, go to the store, driving a car, take walks, etc.

V. Overall aspects of patient's psychological status:

1. Does the patient exhibit acceptance of the disability?

APPENDIX F (Continued)

2. Does the patient experience personality changes? If yes, what causes them?
 3. Does the patient ever exhibit physical violence? If so, when?
 4. Does patient exhibit emotional outbursts? e.g., temper tantrums, anger, inappropriate and excessive laughing. If so, how frequent?
 5. Do you feel the patient has control of his/her emotions?
- V. Adaptation to problem and environment:
1. Does the patient dwell on his/her disability?
 2. Does patient appear interested in his/her recovery?
 3. Does the patient readily accept some responsibilities in the home? e.g., household's chores, signing checks, making shopping lists, etc.
 4. Does patient deal with his problem realistically?
 5. Do you feel the patient has accepted and is able to cope with his/her disability?

APPENDIX G: 100 Word Bliss Symbol
Vocabulary Display

APPENDIX G

100 WORD BLISS SYMBOL VOCABULARY DISPLAY

a	b	c	d	e	f	g	h	i	j
1 0	1	2	3	4	5	6	7	8	9
hello O ← → ← →	question 121	11 I (nety)	10+! like	0↑ happy	^ make action	0 food	pen-pencil /	10+! friend	XX animal
good bye O ← → ← →	why ?>	12 you(you)	10? want	XX<< angry	0 mouth	0~ drink	paper, page 11	GOD A	X bird
please 10	how ?A	1 man	1-1 come	1010 afraid	0 eye	10 sleep	book 11	house 10	flower 9
thanks 10	who ?1	1 woman	1 give	1010 funny	^ legs	10 toilet	table 11	school 10	water ~
I'm sorry 11 10	what thing ?10	1 father	1 make	10+! good	1 hand	10^ pain	television 10 0 10	hospital 10	sun 0
opposite 1	which ?÷	1 mother	1 help	1 big	1 ear	10 clothing	news 9	store 10	weather 10
much, many X	where 1	1 brother	1 -think	1 young, new	1 nose	10 outing	word 10 ÷ 9	show 10	day 0
music d	when ?10	1 sister	1 know	1 difficult	1 head	10 car	light 10	room 11	week-end 10
	how many ?X	10 teacher	1 wash	1 hot	1 name	10 wheelchair	game, toy 10 10 10	street 10	birthday 10
10	a	b	c	d	e	f	g	h	i

100 VOCABULARY
(December 1975)Blissymbolics Communication Foundation
862 EGLINTON Avenue East,
Toronto, Ontario, Canada M4G 2L1Blissymbolics used herein
A Bliss and Exclusive License
Blissymbolics Communication Foundation

APPENDIX H: 200 Word Bliss Symbol
Vocabulary Display

Psychology's Communication Foundation
862 Eglinton Avenue East,
Toronto, Ontario, Canada M6G 2L1

APPENDIX I: 400 Word Bliss Symbol
Vocabulary Display

Joseph P. Lico Communications Foundation
802 911 Union Avenue East
Toronto, Ontario, Canada M4J 2J3

APPENDIX J: Data Collection Forms

SECTION I: Response Record Sheet

SECTION II: LaPointe's Base-10 Response
Form

SECTION III: Verbal Response Record Sheet

APPENDIX J, SECTION I
RESPONSE RECORD SHEET

PATIENT: _____ DATE: _____ TOTAL CORRECT: _____
CLINICIAN: _____ SESSION: _____ TOTAL INCORRECT: _____

1.	Correct	Incorrect	2.	Correct	Incorrect	3.	Correct	Incorrect	4.	Correct	Incorrect	5.	Correct	Incorrect
10			10			10			10			10		
9			9			9			9			9		
8			8			8			8			8		
7			7			7			7			7		
6			6			6			6			6		
5			5			5			5			5		
4			4			4			4			4		
3			3			3			3			3		
2			2			2			2			2		
1			1			1			1			1		
6.	Correct	Incorrect	7.	Correct	Incorrect	8.	Correct	Incorrect	9.	Correct	Incorrect	10.	Correct	Incorrect
10			10			10			10			10		
9			9			9			9			9		
8			8			8			8			8		
7			7			7			7			7		
6			6			6			6			6		
5			5			5			5			5		
4			4			4			4			4		
3			3			3			3			3		
2			2			2			2			2		
1			1			1			1			1		

APPENDIX J, SECTION III
 VERBAL RESPONSE RECORD SHEET

PATIENT: _____ DATE: _____ TOTAL TIME: _____
 CLINICIAN: _____ SESSION: _____ TOTAL INTELLIGIBLE RESPONSES: _____

UNINTELLIGIBLE RESPONSES

With Pointing Without Pointing

TOTAL: _____ TOTAL: _____

INTELLIGIBLE RESPONSES

With Pointing Without Pointing

TOTAL: _____ TOTAL: _____

APPENDIX K: Management Procedures

Abstracted from the Teaching
Guidelines of the OCCC (1974)

SECTION I: Management Goals for Three
Parameters of Bliss Symbol
Acquisition

SECTION II: Symbol Acquisition Techniques

SECTION III: Management Guidelines

APPENDIX K, SECTION I

Management goals for the three parameters of Bliss symbol acquisition abstracted in whole or in part from the Teaching Guidelines of the OCCC (1974) and modified for adult aphasic use:

A. Introduction of new symbols

1. For each symbol the investigator explained and demonstrated its corresponding meaning generally through visual stimulus pictures. If a complex symbol (more than one component part) was presented, the investigator explained how the meaning was derived.
2. Matching symbol with picture stimulus
 - a. Using one picture stimulus
 - b. Using five to 10 different picture stimuli representing same symbol
3. Correct identification of symbol in response to oral command after picture stimulus removed.

B. Using symbols purposefully

1. Demonstrated use of symbols by responding to investigator's questions
 - a. Questions related to a specific symbol(s)
 1. How would you tell me you wanted something to drink?
 2. How would you tell me you were sick?
 3. How would you tell me you wanted fish for dinner?
2. Demonstrated use of symbols by having subject ask trainer questions through one or several symbols
 - a. Bliss symbol cards were arranged in sentence form (left to right) and appropriate grammatical order
3. Demonstrated use of symbols by describing content of stimulus pictures.
 - a. Describe feelings of people
 - b. Describe objects in pictures
 - c. Describe observable actions
 - d. Describe content of picture

APPENDIX K (Continued)

4. Demonstrated use of symbols by engaging in conversation with investigator.
5. Demonstrated use of symbols by discussing a "special topic" introduced by the investigator. Subject was required to explain, ask, and answer questions related to the topic via Bliss symbols.

C. Review of symbols

Review of previously learned symbols was accomplished through repetition and practice drills during 10 minutes at the beginning of each session, incorporating the combination of tasks previously outlined.

APPENDIX K, SECTION II

The following symbol acquisition techniques were abstracted from the OCCC's (1974) Teaching Guidelines:

Instruction of the basic 30 word symbol vocabulary

1. After each subject had acquired a vocabulary of 8-12 nouns, adjectives, and/or verbs, the investigator introduced the pronoun "I" and the verb "to want"  or "to like" . The investigator demonstrated how these symbols can be sequenced to form a complete sentence, e.g., "I want food"    or "I like food"   . From this point on, the subject was encouraged to respond in a complete, grammatically correct sentence whenever possible. The investigator always wrote the individual symbol or group of symbols on paper so the subject could see the sequence of symbols (left to right and correct syntactical order).
2. Subsequent to introduction of body parts, the action indicator was presented. This demonstrated how a body part with the action indicator represented action of that body part, e.g., "ear"  and "to hear" . Exercises included providing situations in which responses to various visual, auditory and olfactory stimuli were required.
 e.g. I see _____
 I smell _____
 I hear _____
3. As previously mentioned, the initial 30 symbols were presented on 3" x 5" index cards. There was consistency in the location of the symbols placed in front of the subject, as often as possible, to correspond with their placement on the 100 vocabulary display.

Introduction of the 100 word symbol vocabulary

1. Subjects were given practice in locating position of symbols already learned. Once the known symbols were easily located, the investigator introduced two new symbols and incorporated them immediately into subject's Bliss symbol vocabulary.
2. During each lesson, an opportunity to ask for a new symbol or symbols of the subject's choice was provided. This symbol was then added to the subject's

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present list of symbols and was incorporated into the three parameters of symbol acquisition.

3. Special attention to the following teaching units in attaining mastery of the 100 word vocabulary was provided:
 - A. Questions
 - B. Manners
 - C. Feelings
 - D. Use of "opposite"
 - E. Use of plural
 - F. Use of "action" symbol to form verbs
 - G. Pronouns: "I" and "you"
 - H. Importance of direction of arrow
 - I. Importance of size
4. If the subject demonstrated difficulty in efficiently searching for and locating the symbols on the 100-word vocabulary display, the investigator provided a more effective method for allowing functional use of the symbols in their present living environment.

APPENDIX K, SECTION III

The following management guidelines were abstracted from the OCCC's (1974) Teaching Guidelines:

1. When subject began to construct short sentences, the investigator responded in the following sequence whenever possible:
 - a. Said the meaning which was printed on the display as the subject indicated it, e.g. I.....want..... food.....table.
 - b. Repeated the meanings of the individual symbols in a series, e.g. I want food table.
 - c. Expanded the meaning to give an English sentence, e.g. I want the food on the table.
 - d. Refined the sentence to a form which was acceptable to the subject, e.g. I want the cereal on the table.
 - e. If applicable, asked for further information through symbols or yes/no replies and expanded the sentence more.
2. As the subject became secure in symbol-meaning relationships, the investigator began to wait for a phrase unit to be completed by the subject. Then the investigator verbalized the subject's output utilizing context and syntax clues to arrive immediately at the expanded form.
3. At all stages of relating with the subject, a written record of the subject's symbol output was provided. Seeing the sequence of symbols relieved the strain on short-term memory for the investigator to afford more concentration on context and syntax.
4. On appropriate occasions, the investigator utilized symbols to converse with the subject, either through the vocabulary display or writing the symbols; however, speech remained an integral part of communication with the subject.
5. When the subject was unable to make himself/herself understood the investigator made the subject aware of the need for improved output. The following suggestions were made:
 - a. Had subject attempt to tell you in another way, i.e. using a different symbol or combination of symbols.
 - b. Structured the situation so that the subject's output gave relevant information.

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- c. Suggested alternatives such as "What kind of a thing is it?"; "What is it used for?"; "What is the most important thing about it?"; or "Tell me what happened" (if relating to an event).

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